Language Input and Outcomes in Bilingual Persian-English Children Attending an Immersion Preschool

A DISSERTATION
SUBMITTED TO THE FACULTY OF THE GRADUATE SCHOOL
OF THE UNIVERSITY OF MINNESOTA
BY

Bita Payesteh

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF
DOCTOR OF PHILOSOPHY

Lizbeth Finestack, PhD
Kathryn Kohnert, PhD

August 2015

Acknowledgments

First and foremost, I would like to gratefully and sincerely thank my co-advisers, Lizbeth Finestack, PhD and Kathryn Kohnert, PhD. I would not be where I am today, or who I am today, without the guidance and support of these two brilliant women. The ambition and passion they possess is impressive and they have taught me more than I could have ever hoped about the true meaning of scholarship, teaching, and mentorship.

Additional thanks to my committee members, Benjamin Munson, PhD and Tara Fortune, PhD for their time, thoughtful insight, and assistance on this project. I would also like to thank Edward Carney, PhD, for his exceptional assistance with statistical analyses and R coding. I am also thankful for the mentorship of Sheri Stronach, PhD.

I would like to acknowledge my research assistants, Layla Safinia and Ericka Lynch, for their tireless work on this project. Layla provided assistance, including her Persian skills, in data collection in California and Minneapolis, and then with data reduction. Ericka assisted in Minneapolis data collection and data reduction. Furthermore, I would like to thank Parastoo Mossadeghi for her instrumental help at Golestan Kids.

Many thanks to the staff, children, and families of Golestan Kids and All Stars Montessori. Your support of this study is greatly appreciated. Yalda joon, I admire your passion and ardent support of the immersion world. You are an inspiration.

Thanks to my PhD cohort, both past and present, your friendship and support is cherished: Jill Rentmeester Disher, Dr. Giang Pham, Dr. Kerry Ebert, Dr. Amelia Medina, Katherine Bangert, Hannah Julien, and Katy O'Brien. I look forward to many years of collaboration, conferences, and camaraderie.

Thank you to my family. My parents, for without whom I would not be where I am today, and my sister, Mahsa, who provides respite in the whirlwind of life. My uncle, Dr. Sayeed Payesteh who has always been a great supporter of my education, even in ways I couldn't imagine. (I would be remiss if I did not mention the copious amounts of home cooked food.) And the rest of the Payesteh, Ahmadi, Gulati, Hanaie, Hamamcy, and Hays clans. Your love and our crazy family get-togethers have provided so much balance and color to my life. I would also like to acknowledge my aunt, Maryam Payesteh Ahmadi, and the incredible work she has done over her lifetime in education. She has been a great source of inspiration for me.

And last, but certainly not least, I wish to thank my wonderful husband, Jackson. He has never wavered in his support for me and my endeavors, and never lets me forget that he is, indeed, my biggest fan. Thank you for all of your love, dedication, brilliant editing, and magnificent cooking skills. I am humbled.

This project was funded by the Department of Speech-Language-Hearing Sciences' Bryngelson Award and the College of Liberal Arts' Research and Creative Travel Funds.

Dedication

I would like to dedicate this dissertation to my parents, Vahid and Nadereh Payesteh. They left their home in Iran (with me as a 6-month old in tow), and came to this country to provide a better life for their family. For that I am forever thankful. They set me up to pursue the best opportunities available, and throughout my life they have made sure I always remember my Persian heritage. I would not be where I am, or who I am, without them.

Abstract

Background: Despite the growing number of Persian-speaking people in the U.S., little is known regarding the language development of children learning Persian and English. Researchers studying Persian or Persian-English speakers typically only investigate one or two very specific areas of speech or language. However, there is no research examining how the amount of exposure to Persian and English and the amount of Persian and English spoken by children influences their language skills (e.g., vocabulary, morphosyntax).

Method: Participants were two groups of preschool children, Persian-English bilingual (BI) children (n = 15) and English-only speaking (EO) children (n = 17); all children were 2 through 5 years of age. BI children attended a Persian immersion preschool in the San Francisco area and EO children attended English-only preschools in the Minneapolis area. BI participants completed a series of vocabulary and morphosyntax tasks in Persian and English; EO participants completed the same English series.

Results: Results indicate a) no significant differences between the English scores of the BI and EO groups, b) significant differences in the BI group's English and Persian scores, c) significant cross-domain relationships within Persian and within English for the BI group, d) significant cross-linguistic relationships for Persian and English vocabulary and Persian and English morphosyntax, and e) notable trends that highlight the impact of the amount of parental language input and child language production on language skills.

Conclusion: Across all the analyses, study results consistently suggest that greater heritage language support is beneficial for bilingual children and not detrimental to language development of the majority language, English.

Table of Contents

Acknowledgments	i
Dedication	ii
Abstract	iii
List of Tables	vi
List of Figures	vii
List of Appendices	viii
CHAPTER 1: Introduction	**1**
CHAPTER 2: Literature Review	**4**
Theoretical Framework	4
Overview of Language Skills in Monolinguals and Bilinguals	8
Factors Affecting Bilingualism	15
Immersion Education	20
Iranians, Culture, and Language	22
CHAPTER 3: The Current Study	**25**
Predictions	26
CHAPTER 4: Method	**28**
Participants	28
Study Procedures	33
Parent Questionnaire	34
Language Tasks	36
CHAPTER 5: Statistical Analyses	**41**

CHAPTER 6: Results **43**

Specific Aim 1: Comparison of Bilingual Preschoolers to Monolingual Peers 43

Specific Aim 2: Persian and English Vocabulary and Morphosyntactic Language Skills of Bilingual Preschoolers 44

Specific Aim 3: Cross-Domain Relationships Within One Language 45

Specific Aim 4: Cross-Linguistic Relationships 45

Specific Aim 5: Language Input and Language Production 46

CHAPTER 7: Discussion **57**

Specific Aim 1: Comparison of Bilingual Preschoolers to Monolingual Peers 57

Specific Aim 2: Persian and English Vocabulary and Morphosyntactic Language Skills of Bilingual Preschoolers 58

Specific Aim 3: Cross-Domain Relationships Within One Language 60

Specific Aim 4: Cross-Linguistic Relationships 60

Specific Aim 5: Language Input and Language Production 61

Limitations 67

Future Directions 68

Conclusion 70

References **72**

Appendices **88**

List of Tables

		Page
Table 1	BI and EO Group Participant Characteristics	31
Table 2	Language Tasks	37
Table 3	Descriptive Statistics for Language Tasks for BI and EO Groups	44
Table 4	Descriptive Data for Language Environment for BI Group	47

List of Figures

		Page
Figure 1	Pearson's (2007) Model of Factors Influencing Language Proficiency	6
Figure 2	Raw Scores on Persian and English Tasks with Respect to Parental Persian Input	49
Figure 3	Raw Scores on Persian and English Tasks with Respect to Parental English Input	51
Figure 4	Raw Scores on Persian and English Tasks with Respect to Persian Child Production	53
Figure 5	Raw Scores on Persian and English Tasks with Respect to Child English Production	56

List of Appendices

		Page
Appendix A	Background Information Parent Questionnaire	88
Appendix B	Sample Items from Protocols of Persian Battery	95

CHAPTER 1: Introduction

شاگردی روزگار کردم بسیار
در کار جهان هنوز استاد نیم

- Omar Khayyam

In the United States, the number of people who are bilingual, or speak and understand two languages, is increasing at an exceptionally fast rate and changing the linguistic landscape. The U.S. Census Bureau estimates that about 20% of people over the age of 5 years speak a language other than English at home, which is an increase of 140% over the past 30 years (Shin & Kominski, 2010). In the past 30 to 35 years, people emigrating from Iran have contributed to the increase of racial and linguistic diversity in the U.S. and are a prominent minority group. The U.S. Census Bureau reports the U.S. population of Iranians to be 458,798 (U.S. Census Bureau, 2013), though some estimates put the Iranian population in the U.S. much higher, up to 1 million (The Public Affairs Alliance of Iranian Americans, n.d.). Immigration of this population stems primarily from the upheaval of the 1979 government and the Iran – Iraq War (1980-1988) which caused an exodus of over two million Iranians (or about 5% of the population) (Namei, 2008). The official language of Iran and Iranians is Modern Persian; there are two close variations spoken in Tajikistan (i.e., Tajiki) and Afghanistan (i.e., Dari), which are generally mutually intelligible. There are many other dialects, but the most commonly spoken form in larger cities in Iran and in the diaspora around the world is Modern Persian.

Despite the growing number of Persian-speaking people in the U.S., little is known regarding the language development of children learning Persian and English. Some researchers have investigated the language development of young monolingual

Persian-speaking children (Foroodi-Nejad, 2011; Keshavarz & Safa, 2010). However, there is no research examining the language of children learning Persian and English. Specifically, it is unknown how the amount of exposure to Persian and English and the amount of Persian and English spoken by a child influences their language skills (e.g., vocabulary, morphosyntax). Researchers studying Persian or Persian-English speakers typically only investigate one or two very specific areas of speech or language, such as orthographic skills, consonant clusters, relative clauses, or compound words (e.g., Arab-Moghaddam & Sénéchal, 2001; Boudaoud, 2008; Farsi & Leila, 2013; Foroodi-Nejad & Paradis, 2009).

Research with typically developing bilingual populations is important because by better understanding bilingual language skills and development, we can have a stronger command in determining when language development is disordered or impaired in bilingual children. The language skills and developmental trajectories of children learning two languages are not identical to monolingual children learning any one language (e.g., Pham & Kohnert, 2010, 2013), which makes the study of bilingual language even more essential. Moreover, investigating different language pairs (e.g., Hmong-English, Vietnamese-English, Spanish-English, German-English) helps inform theories of language development and the influences of each language on a child's two languages. Additionally, research shows that the maintenance of a heritage language (i.e., a language other than English in the U.S., sometimes referred to as a minority or home language) is vital in multicultural populations. Children or adolescents who are able to speak their family's heritage language may reap psychosocial and academic benefits (Tseng & Fuligni, 2000), they may have great confidence in their college success

(Aguayo, Herman, Ojeda, & Flores, 2011), and they may have stronger family cohesion (Portes & Rumbaut, 2001).

In the current study, I examined the language skills of emerging bilingual children; specifically, the lexical (i.e., vocabulary) and morphosyntactic (i.e., grammar) skills of bilingual Persian-English children attending a Persian immersion preschool in the U.S. I further investigated the potential influence of two factors on children's language skills: the amount of exposure to each language and the amount the children speak each language. To provide a review of the literature relevant to the current study, in the following sections I review the theoretical framework of the current study, bilingual language development, language immersion programs, and the relationship of Iranians and Iranian-Americans to the Persian language.

CHAPTER 2: Literature Review

Theoretical Framework

There are numerous ways to define bilingualism. For present purposes, this term is operationalized as the ability to utilize at least two languages in some capacity, where language comprehension and production may fluctuate based on various factors such as age or developmental stage, exposure to each language, opportunities to use each language for meaningful purposes, and parent socioeconomic or education status (American Speech-Language-Hearing Association, 2004; Kan & Kohnert, 2005; MacLeod, Fabiano-Smith, et al. 2012; Pearson, 2007). Bilingualism may result from many different types of environments, including, but not limited to: children who grow up hearing and producing (i.e., speaking) two languages, children who learn a second language in school, or adults who learn a second language later in life. In this study, the primary focus is on children who are exposed to two languages from either birth, or in early childhood (i.e., before 30-months old for the current study). The former is often referred to as *simultaneous bilingual* or *bilingual first language acquisition* (BFLA; Pearson, 2008) and the latter is referred to as *sequential* or *early second language acquisition* (Early SLA; Pearson, 2008). The line between when language learning is considered simultaneous or sequential is not precise. There is no definitive age at which bilingualism switches from simultaneous to sequential. Some researchers qualify simultaneous bilinguals as children who are exposed to two languages from birth (Extra & Verhoeven, 1999; Padilla & Lindholm, 1984), while others consider simultaneous to include children who are exposed to a second language before the age of 3 years (Montrul, 2008).

The quality and quantity of language input (i.e., exposure) is a key factor in both monolingual (e.g., Hart & Risley, 2003; Hoff-Ginsberg, 1985) and bilingual language development (e.g., Pearson, 2007). In this study I investigate input as well as the amount of language spoken by children in each language when speaking to friends and family. Pearson's (2007) research provides a strong foundation for this study. Pearson's work has been, in part, based on research such as Hart and Risley's (1992) work which showed that in monolingual families, the number of words parents use with their 1- to 3-year old children strongly correlated with the size of their children's vocabulary, demonstrating the importance of a child's early language environment.

Pearson's (2007) basic model of language proficiency in bilinguals is displayed in Figure 1. Proficiency in bilinguals has been defined as the "knowledge and performance skill in each of the two languages" (Kohnert & Bates, 2002, p. 349) where a fully proficient bilingual can speak both languages, alternating between the two when necessary. In the current study, proficiency was specific to oral language on preschool-level academic and conversational language tasks.

In Pearson's (2007) model, the language input children receive in a particular language directly influences their proficiency, which can in turn influence how much of that particular language they use (i.e., produce). For example, in a study by de Houwer (2004), she found that parental input accounted for 84% of the variance in trilingual children's language patterns. Attitudes towards the language (positive or negative) and the age at which the child acquires the language, are pertinent to the child's proficiency as well. If attitudes from parents and/or the broader community, for example, are positive towards bilingualism and the two languages, this can increase the effectiveness of the

cycle of proficiency (Figure 1), while negative attitudes may decrease input, use, and subsequently, proficiency. Pearson's model is further supported by other investigations of bilingual development (Genesee, 2008; Goldstein, 2006; Hammer et al., 2012; Kohnert, 2010; Pearson et al., 1997; Pearson, 2007).

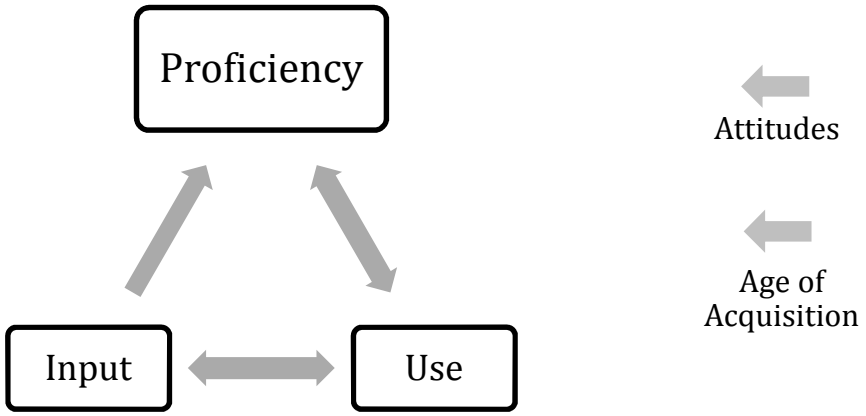

Figure 1. Pearson's (2007) Model of Factors Influencing Language Proficiency

Bilingual language development is also influenced by what Kohnert (2009) refers to as MOM: means, opportunity, and motive. *Means* is the child's internal abilities (e.g., integrity of the child's cognitive-linguistic processing system); if there is some disparity in the child's processing system, as is the case for a child with language impairment, they may not have the means to develop language like a typically developing peer. *Opportunity* is the availability of language in the environment and the child's use of language for meaningful purposes, so the greater opportunities presented to a child, the greater opportunity they have to hear and speak their language. *Motive* is the interaction between internal abilities and external opportunities (which relates to the social context and prestige of each language in the child's different environments). Motive also refers to

the idea that a bilingual may have different purposes for their two languages; one language may be used for school and the other may be used with family.

Kohnert's (2013, p. 14) Dynamic Interactive Processing theoretical framework (DIP) helps to further characterize the role of environment in language development, which explains language and bilingualism as "a dynamical system that emerges within a social context through interactions of cognitive, neurobiological, and environmental systems and subsystems across nested timescales." This perspective stresses the relationship between a bilingual child's two languages and external factors, including the context of language input. For example, consider a child who is born in the U.S. to Persian-English bilingual parents and hears primarily Persian at home and English in the community. This child may have a slight bias toward using English because of the large amounts of input from the community. When the child is 2-years old, the family then moves to Iran, greatly increasing the child's exposure to Persian, thus greatly shifting the bias to Persian. If one year later, the family moves back to the U.S., the language demands may shift back to English for the child, dependent on school or day care attendance and general time spent around English speakers. Finally, at 4 years of age, the child may enroll in a Persian immersion preschool, shifting the language emphasis back to Persian, or at least placing a strong emphasis on it. Because of the prevalence of English (the language of the majority community), there may not be a complete shift to Persian, considering the child's English experiences and needs. Each of these situations alters the language context, potentially affecting language input and use, yet underscores the importance of dual-language development.

Overview of Language Skills in Monolinguals and Bilinguals

Language skills in monolinguals. To better understand the nature of bilingual language development, it is important to have a good understanding of monolingual language development, or the language development of children who learn and are exposed to one language. The development of language begins before a child is born. Infants are first exposed to sounds from their surroundings around 26 weeks in utero (Birnholz & Benacerraf, 1983) and can recognize the voice of their birth mothers by 4 to 6 weeks of life (Mehler, Bertoncini, Barrière, & Jassik-Gerschenfeld, 1978). They even show a preference for their mother's language at birth, as opposed to another language (Nazzi, Bertoncini, & Mehler, 1998). Infants begin to demonstrate that they understand words around 9 to 10 months of age. In that first year of life, infants engage in various prelinguistic behaviors such as cooing and babbling and also making requests and taking turns with vocalizations or gestures (Capute & Accardo, 1978; Oller, 1980). Once children begin to produce words, generally around 12 months of age (though a wide range is typical: 9 months to 16 months of age), they learn about 8 to 11 words a month. It is expected that by 18 to 24 months of age children will have at least 50 words in their vocabulary (Hoff, 2005).

Typically developing 2-year old children produce anywhere from 100 to 600 different words, with 225 as the median number of words for 23-month-old English-speaking children in the U.S. (Fenson et al., 1994). Toddlers who have at least 50 words combine two words together with basic sentence structures such as, "that truck," and "birdie go." For English, these structures are also known as Stage I in Brown's Stages of Syntactic and Morphological Development (Brown, 1973). By the time these English-

speaking children are 3-years old, they generally understand about 1,000 words and produce a mean length of utterance in morphemes (MLU-m) of about 3.0 (e.g., "doggy on sofa"). Language skills continue to grow in 4-year old children with the production of greater and more sophisticated grammatical and narrative features. By 5 years of age, children produce most English grammatical inflections (e.g., "my cars" and "it going") and use complex features of the English language, including third person irregular forms (e.g., "he does") and contractible copulas (e.g., "she's ready") (Bates, Bretherton, & Snyder, 1991; Brown, 1973).

Language development in bilinguals. When socioeconomic status (SES) is matched, simultaneous bilingual children (i.e., those exposed to two languages from birth or shortly after) attain early communication milestones (e.g., lexical development) at the same age as their monolingual peers (Spanish-English: Pearson, Fernández, & Oller, 1993; French-Quebec Sign Language: Petitto et al., 2001). Development for sequential bilinguals varies based on factors such as the age they are exposed to the second language, the amount of input they receive in that language, and opportunities for using the second language. However, because of differences across languages and differences in language input, the lexical and morphosyntax development of bilingual children may differ from monolinguals depending on the languages being acquired (e.g., Spanish and English, Hmong and English). Researchers agree that to better understand bilingual language development and cross-linguistic influences in children, we must study a wide range of languages (Yip & Matthews, 2010). Thus, the current study compared the lexical and morphosyntactic skills of Persian-English bilingual children and English monolingual children with similar parent education and income levels.

Bilingual vocabulary development. Lexical development is similar for bilingual and monolingual speaking children. Both groups produce their first words at about 12 months of age and have comparable rates of vocabulary growth (Genesee, 2008). Despite these similarities, evidence from some studies on lexical development reveal that a bilingual child's vocabulary in one of their two languages may appear to be less than that of their monolingual peers. However, their total conceptual vocabulary (i.e., the total number of concepts known in both of their languages, as opposed to words known in just one of the languages) is comparable to developmental expectations of monolingual children (Hoff et al., 2011; Pearson et al., 1993).

It is also important to note that some sequential bilingual children in the U.S. demonstrate more rapid growth in English, their second language, once they enter school, while their heritage language plateaus. These patterns have been demonstrated in different language pairs, such as the vocabulary skills of Mandarin-English bilingual children who attended Mandarin after-school programs (Sheng, Lu, & Kan, 2011) and Hmong-English preschoolers who attended a Hmong-English bilingual preschool (Kan & Kohnert, 2005). In a cross-sectional study with 2- to 5-year-old bilingual children, Kan and Kohnert found that the older children performed better than the younger children in English, but not in Hmong, suggesting that Hmong language skills stabilized while English improved with age. These findings demonstrate the strength of English in the U.S. Overall, while children may be able to develop two languages equally well in theory, they may have differences in opportunities (e.g., less contact with native speakers of their heritage language) or motivation for use (e.g., using English because their friends all speak English).

Bilingual morphosyntactic development. Morphosyntax, or grammar, is the intersection of morphology and syntax. It is an area of particular difficulty for many children with language impairment and a robust indicator of language impairments in some languages, including English (Genesee, 2008). Research indicates that typically developing bilingual children generally acquire morphosyntactic properties in each language in the same sequence and rate as monolinguals of the respective language (Bedore, Cooperson, & Boerger, 2004; Paradis & Genesee, 1996). For example, Paradis and Genesee (1996) found that French-English bilingual children acquire French and English negation of verbs (e.g., *n'aime pas* and *do not like*) similarly to French and English monolingual peers, respectively. These bilingual children were simultaneous bilinguals and in a geographical area where both languages maintain a high level of prestige. Bilingual children also make similar morphosyntactic errors; however, they may use only some of the morphosyntactic devices available (i.e., the morphosyntax adults use) in a language akin to monolinguals (De Houwer, 2005).

Persian language development. Few published articles describe typical Persian language development in young children. However, available data reveals that Persian-speaking children follow similar early vocabulary developmental patterns as English-speaking children, including the rate at which words are learned (i.e., a vocabulary "spurt") and noun dominance in early lexicons (M. Keshavarz & Safa, 2010). In contrast to English developmental patterns, in which children's production of uncontractible copulas, for example, begins to develop at 36 to 42 months and contractible copulas develop closer to 42 to 52 months (Brown, 1973), Persian-speaking children produce

sentences with copulas (e.g., *gol-e* meaning "it's a flower") in earlier stages of language development, as early as 16 months (Keshavarz, 2007).

Associations within and across languages. Cross-linguistic relationships, or the within-child association between two different languages (e.g., Persian and English), have been found in the lexical skills of both sequential (Kan & Kohnert, 2008, 2011) and simultaneous (Conboy & Thal, 2006) bilingual children. These relationships are important because they indicate a possible interdependence between the two languages of bilinguals. For example, Kan and Kohnert (2008) studied Hmong-English bilingual children and found that when receptive vocabulary scores increased in Hmong (L1, or the children's first language), expressive vocabulary scores in English (L2, or the children's second language) were likely to increase. Thus, the children who understood more words in Hmong also produced more words in English. Furthermore, Conboy and Thal (2006) found positive cross-linguistic relationships in their study of 20- to 30-month old Spanish-English bilingual children. The number of words produced in English predicted the mean length of utterance (MLU) in Spanish at the final time point in the study.

Additionally, Pearson, Fernández, and Oller (1995) found that the productive vocabularies of 8- to 30-month-old Spanish-English bilingual children included about 30% translation equivalents (i.e., words for the same concept in each language, such as "table" in English and "mesa" in Spanish), suggesting that children identified some referents with two words from two different languages, with the majority of words represented in only one language. A cross-sectional study (Kan & Kohnert, 2005) with children aged 3 to 5 years found that the youngest children had some translation equivalents (picture naming: 10%, picture identification: 40%), but the bulk of their

vocabulary knowledge was in one of their two languages. In contrast, the oldest children had a greater proportion of conceptual knowledge present in both languages (picture naming: 23%, picture identification: 54%). Similarly, Peña, Bedore, and Zlatic-Giunta (2002) found that 68% of lexical items produced by 6- to 8-year olds were unique to either Spanish or English. Based on findings from these studies, it appears that at least for 3- to 8-year old children, there is an interdependence of the children's word to word mappings in their two languages.

Significant relationships between lexical and morphosyntactic language domains have been found in monolingual (English: Goodman & Bates, 1997; Spanish: Jackson-Maldonado, Thal, Marchman, Bates, & Gutiérrez-Clellen, 1993), simultaneous bilingual (Marchman, Martínez-Sussmann, & Dale, 2004), and early sequential bilingual children (Kohnert, Kan, & Conboy, 2010). In a study by Simon-Cereijido and Gutiérrez-Clellen (2009) with 3- to 7-year old Spanish-English bilingual children (with varying levels of proficiency in each language), vocabulary skills were strongly and positively associated with the children's morphosyntax (as measured by MLU-w, or mean length of utterance in words) within a single language. Kohnert, Kan, and Conboy (2010) studied sequential 2- to 5-year old Hmong-English bilingual children who attended a Hmong-English preschool and whose exposure to English began in early childhood. They found strong, positive relationships within each language between a morphosyntactic measure (i.e., utterance length) and a lexical measure (i.e., MLU-w) (Kohnert et al., 2010). In studying the language of 6- to 11-year old sequential Vietnamese-English bilingual children, Pham (2011) also found strong positive cross-domain relationships. In English, there were strong, positive cross-domain associations between lexical and grammatical task

performance, and in Vietnamese, there were moderate to strong associations between lexical, grammatical, and narrative task performance. These children attended a school that offered Vietnamese language classes.

Marchman and colleagues (2004) found that 15- to 30-month old simultaneous Spanish-English bilingual toddlers had strong vocabulary-syntax relationships within each language. That is, children with strong vocabulary skills in Spanish had strong Spanish grammatical skills. This suggests that syntax learning in one language is related to the vocabulary skills in the same language. Similarly, in studying vocabulary development of 20- to 30-month old Spanish-English bilingual children, Conboy and Thal (2006) found that increases in morphosyntax (i.e., sentence complexity) were positively related to vocabulary increases in the same language.

Kan and Kohnert (2011) found cross-domain and cross-linguistic associations between sequential Hmong-English bilingual children's existing vocabulary and novel word learning abilities. First, as children's English vocabulary scores increased, so did their ability to learn and produce novel words in English. Additionally, as children's Hmong vocabulary scores increased, so did their ability to learn novel words in English. In contrast, the larger the child's English vocabulary was, the slower they were to produce Hmong words. Furthermore, in a study with 22- to 25-month-old simultaneous bilingual children, Parra, Hoff, and Core (2011) found significant positive cross-domain relationships between vocabulary and morphosyntax within each language, and cross-linguistic relationships in vocabulary between Spanish and English. Children's language skills were assessed via parent report on the MacArthur–Bates Communicative Development Inventory (CDI) (Fenson et al., 1994) and its Spanish version, the

Inventario del Desarrollo de las Habilidades Comunicativas (IDHC) (Jackson-Maldonado et al., 1993). The authors suggested this was because of a common underlying capacity in early language development.

The cross-linguistic and cross-domain associations found in these studies support the DIP (Dynamic Interactive Processing theoretical framework; Kohnert, 2013) specifically because they demonstrate significant interactions between languages within an individual. These results demand that researchers continue to examine within-child cross-domain and cross-linguistic relationships in more language pairs to more fully understand the implications for language learning. Researchers have examined cross-domain and cross-linguistic relationships in many language pairs, but not yet in Persian-English bilinguals, which the current study aims to remedy.

Factors Affecting Bilingualism

Language input, or the amount of language heard by children, and language production, or the amount of language spoken by children, influences the language skills of children. As language input and child language production change across time, the relative proficiency of each language is likely to change. The more input a child receives can influence the amount of language production in the same language; both increased input and production can then influence language proficiency in a language (Pearson, 2007). It is important to note that language input and production are not the only factors affecting language development. There are many other factors that may contribute to language development, such as socioeconomic status, home literacy, and parent education (Kohnert, 2010). In the following section, I focus on language input from parents and children's language production.

Language input from others. The quality and quantity of language input of a child's heritage language influences development of that language (Hammer et al., 2012; Hammer, Davison, Lawrence, & Miccio, 2009; Pearson et al., 1997; Pearson, et al., 1993; Place & Hoff, 2011). For example, in one longitudinal study, Pearson et al. (1997) found that Spanish input from parents accounted for nearly two-thirds of the variance related to Spanish vocabulary learned by 8- to 30-month old Spanish-English simultaneous bilingual children. Children's vocabulary skills were measured using a standardized parent report instrument, the MacArthur Bates Communicative Development Inventories (English: Fenson et al., 1994) and the Spanish version (IDHC: Jackson-Maldonado et al., 1993). Pearson et al. concluded that the vocabulary learned by children in each language was generally proportional to the time they spent with speakers of the respective language.

More recently, Thordardottir (2011; 2014) studied French-English simultaneous bilingual children. Thordardottir calculated input provided by parents, caregivers, or other major communication partners based on parent questionnaire. She found strong relationships between the amount of language exposure and vocabulary skills (i.e., standardized vocabulary assessment) in 5-year-old children (2011), and morphosyntactic skills (i.e., grammatical measures from language sampling) in 3- and 5-year olds (Thordardottir, 2014). Furthermore, Thordardottir (2011) found that the bilingual children who had equal input in each language performed similarly to monolinguals of each language, but children with unequal input had unequal task performance, where the weaker language was significantly below that of monolinguals. In a study of 4-year old simultaneous German-French bilingual children in Canada, MacLeod, Fabiano-Smith,

Boegner-Pagé, and Fontolliet (2013) found a positive relationship between amount of exposure to French (i.e., the language of the majority culture) and children's vocabulary in French, but not in the home language of German. In even older children, Willard, Agache, Jäkel, Glück, and Leyendecker (2014) also found a positive association between the Turkish vocabulary skills of 6-year old and 10-year old Turkish-German bilingual children and maternal vocabulary use in Turkish.

In a longitudinal study, Hammer et al. (2009) examined the relationship between maternal language use and the receptive Spanish and English vocabulary skills of early sequential Spanish-English bilingual children in the U.S. Children were initially exposed to English, on average, at age 27 months (SD = 24 months). Children's initial age of exposure to English parental input varied greatly. Sixty percent of parents primarily spoke Spanish with their children and 12% primarily spoke English. They found maternal use of the heritage language (i.e., Spanish) influenced and improved children's Spanish vocabulary without impacting their English vocabulary. In contrast, increased English use by mothers led to a slower growth in children's Spanish vocabulary and did not generate substantial gains in English.

Studies such as these demonstrate the importance of language input and the social context of this input to children's language skills across a range of ages, as assessed by a range of language measures, and in a variety of languages. The results clearly indicate that parental language input significantly impacts language development in each language of a bilingual child. However, it is important to note that the input-production relationship is not absolute; as previously mentioned, other variables may influence children's language skills. Other evidence indicates that even when input is comparable

in a child's two languages, one language may be dominant in the child's productive language (MacLeod, Laukys, & Rvachew, 2011; Paradis, 2009; Patterson, 2002). For example, Patterson (2002) examined inputs of Spanish and English and how they relate to vocabulary skills in Spanish-English bilingual children (Range $_{age}$ = 21- to 27-months old). While the mean amount of exposure to the two languages was close (i.e., Spanish 46%, English 54%), the children's mean vocabulary size in English was nearly double their Spanish (i.e., English 98 words, Spanish 50 words).

These studies relate the aforementioned theories and theoretical frameworks: to Pearson's model (2007; Figure 1) by demonstrating how input is related to language proficiency; to Kohnert's (2009) concept of MOM because a child in different environments has different motives and opportunities for which language they will be exposed to and speak; and to Kohnert's DIP framework because these studies show how different contexts can guide children's language skills. The current study takes these factors into account by investigating the percentage of time parents speak Persian and English to their children.

Language production by children. Although research findings indicate that language input significantly impacts children's language development, many researchers have found language production (i.e., child language output) to play a role in language development (Bohman, Bedore, Peña, Mendez-Perez, & Gillam, 2010; Hammer et al., 2012). In a study with Spanish-English bilingual kindergarteners, Bohman et al. (2010) found that children's abilities as measured by Spanish and English vocabulary and morphosyntax tasks in each language were more related to their use of each language, or production, than to language input. The kindergartners included both simultaneous (i.e.,

exposure to both languages since birth) and sequential (i.e., exposure to English upon entrance to school) bilinguals. Language input and children's language production were based on parent responses regarding language practices, or time children spent hearing and speaking each language averaged across weekdays and weekend days. Vocabulary and morphosyntactic skills were based on the Bilingual English Spanish Oral Language Screener (BESOS; Peña, Bedore, Gutierrez-Clellen, Iglesias, & Goldstein, n.d.), which consists of two subtests, semantic and morphosyntactic. Bohman et al. found increased production of each language correlated with higher semantic and morphosyntactic scores in both languages, while parental input was related to only Spanish language skills. In a study of simultaneous and early sequential Spanish-English bilingual children, Hammer et al. (2012) investigated input and production. The researchers found that children who spoke more English with their fathers and teachers, and whose mother's had greater English proficiency, had stronger English vocabulary skills. In contrast, children who spoke less English and whose mothers had less English proficiency, had higher Spanish vocabulary scores.

These results are consistent with Pearson's (2007) input-use model and Kohnert's (2009) concept of MOM presented earlier, which demonstrate that both language input and production play an important role in the development of each language. Bohman et al. (2010, p. 10) suggest that language production by the child is important because it "forces the learner to process the language in a way that only hearing it does not." The current study takes these factors into account by investigating the percentage of Persian and English the children speak, as well as the amount of language to which children are exposed.

The aforementioned bodies of research reveal the intricacies of bilingualism and different relationships that are of importance for researchers, as well as the importance of language input and language production in bilingual language development. While bilingualism has grown in the U.S., some minority populations are losing their heritage languages, particularly when families have been in the U.S. for several generations. One way for these families to ensure bilingual language development is with language immersion education. Other families are also turning to immersion schools and programs to promote bilingualism and biculturalism in their children because of the benefits of such an education, some of which will be addressed in the following section.

Immersion Education

Bilingual children whose heritage language is a minority language (e.g., a language other than English in the U.S.) are at high risk for losing proficiency in that language, especially upon entering school (Chhuon, 2011; Enstice, 2012). This is likely because once children enter school their English language input and production becomes dominant out of necessity. Upon entering school, bilingual children may even tend to shift to using more English at home. Thus, they are using their heritage language less, or getting less practice (Fillmore, 1991; Rumbaut, 2009; Veltman, 1988). One way to help retain or increase heritage language skills is through immersion education.

The goal of immersion education programs is to foster bilingualism, biliteracy, and biculturalism. Heritage language immersion education programs are one way for children to develop skills in the language of their families (i.e., the language associated with a child's culture or heritage). Such programs or schools aim to teach, maintain, and/or preserve skills associated with a minority language (e.g., non-dominant, non-

mainstream, native, or heritage; a language other than English in the U.S.). There are four broad types of immersion methods or schools: one-way, two-way, indigenous language immersion, and developmental/maintenance bilingual education (Tedick, Christian, & Fortune, 2011). One-way immersion programs include linguistically homogenous students (e.g., all English-speaking) who are put into a school where they receive academic instruction in a foreign language (e.g., Mandarin). Two-way, or dual language, immersion programs include children whose native languages differ (e.g., Spanish or English) and they attend a school in which both English and Spanish are used for instruction. Indigenous language immersion programs are intended for indigenous or aboriginal cultures and languages that may be or are at risk of dying out. These programs may be one-way or two-way depending on the population. Finally, developmental or maintenance programs focus on children with similar linguistic and cultural backgrounds who are learning a minority (e.g., heritage) language.

Without active intervention, heritage languages tend to die out within three generations (Wiley, 1996). Therefore, it is important to promote heritage languages, as proficiency in heritage languages may provide long-term advantages. Adolescents may reap psychosocial and academic benefits through proficiency in their family's heritage language(s), such as closer ties to their families (Tseng & Fuligni, 2000). For example, one study found that Mexican-Americans' relationship with their Mexican culture and language was associated with higher high school grade-point average, and students who had strong associations with both the Mexican and American cultures reported greater confidence in their college success (Aguayo et al., 2011). Portes and Rumbaut (2001) also found stronger family cohesion (e.g., less conflict) and higher educational aspirations

and achievement in junior high school students who were bilingual. Thomas, Collier, and Collier (2011) demonstrated that children attending two-way immersion programs perform just as well, or better, than their monolingual peers when controlling for socioeconomic status.

In this study, the bilingual group of children attended Golestan Center for Language Immersion and Cultural Education in Berkeley, CA, a preschool that provides Persian language immersion. The school is a blend of the above-mentioned methods. It teaches 100% of its curriculum and nonclassroom activities in Persian, a heritage but not indigenous language. The teachers and staff do not speak English during the school day. The students at Golestan have a mix of Persian-speaking abilities when they enroll (i.e., from zero proficiency to fluent for their age). At Golestan only the heritage language, Persian, is supported, but it is considered additive (i.e., adding Persian language skills in addition to English) because the children receive English input through the greater community and most of the children have one parent who primarily speaks English with them. Golestan is focused on advancing Persian skills already acquired, or teaching Persian in an effort to preserve the language of the children's parents and cultural community.

Iranians, Culture, and Language

Iranians in the U.S. are a population of mostly bilinguals who tend to place high value on education. Additionally, most Iranians left Iran for political, social, or religious reasons, not necessarily for economic opportunity. In 2011, 58% of Iranians and Iranian-Americans over the age of 25 years reported that they held at least a bachelor's degree with 27% of the population having a graduate degree or above, as compared to 30% of

the general American population (over 25) who held bachelor's degrees. In 2013, the majority of Iranians (54%) stated their annual household income was over $60,000, which is comparable to the $61,400 median U.S. household income (Public Affairs Alliance of Iranian Americans, 2013; U.S. Census Bureau, 2013). This makes the Iranian and Iranian-American community educationally and economically advantaged.

In the U.S. it is estimated that about 450,757 people over the age of 5 years speak Persian at home (U.S. Census Bureau, 2012). Of those who speak Persian at home, nearly three out of four people (72%) reported speaking English very well (U.S. Census Bureau, 2012). Iranian parents in the U.S. often respond that the Persian language is one of the most important aspects of their culture and it is important for them to pass it on to their children (Mostashari & Levels, 2004; Salahshoor, 2011).

Basic features of the Persian language. Persian is the official language of Iran and is also spoken in Tajikistan and Afghanistan. There are many dialects, but the most commonly spoken form in larger cities in Iran and in the diaspora around the world is Modern Persian. Diglossia, or the difference between the formal written language and other varieties (e.g., conversational), is a primary feature of colloquial Persian (Yousef & Torabi, 2012). Here, I will focus on the colloquial form. Persian is an Indo-European language and comes from the branch of Indo-Iranian languages that also includes Hindi, as well as Germanic languages such as English; despite this, Persian and English are quite different (Mahootian & Gebhardt, 1997). Unlike English, which has a strict word order and relatively few inflectional morphemes, Persian is a morphologically rich language in which most verbs are inflected for number and person. Verbs are also

agglutinative, meaning that the speaker can express a full thought or sentence in a single verb, such as *oomadam* or "I am coming" (Keshavarz, 2007).

Sentence structure in Persian is subject-object-verb, though there is flexibility (Karimi, 2003). As with English, there is no grammatical gender in Persian. There are two possible plural endings for nouns, one of which comes from Arabic. The Persian plural suffix *-ha* is most commonly used, especially in colloquial Persian. In Persian, the adjective typically follows the noun, unlike English, and only has one form (regardless of number, gender, and case) (Keshavarz, 2007). One unique aspect of Persian is that adjectives are connected to nouns with the *ezafe*, *-e* (e.g., *mobl**-e** sabz*, green couch). The *ezafe* is not only used for connecting adjectives, but also to connect most other words to each other. It has been suggested that the *ezafe* in these other contexts is close to the English preposition "of." Indirect objects are preceded by prepositions while a direct object is not. Direct objects instead are marked with the post-position particle, *ra*, which immediately follows the object or the object and its attributes (e.g., *ketab **ra** kharidam*, I bought the book). Although *ra* is an inflectional marker, it is written independently or separate from other words.

CHAPTER 3: The Current Study

This study examined the language abilities of 2- through 5-year old Persian-English bilingual children living in the U.S. Using a cross-sectional design, I compared the vocabulary and morphosyntax skills of bilingual children attending a Persian immersion preschool to an age-matched monolingual peer group who attended an English-only preschool program. Within the bilingual group, I further evaluated the language development of Persian and English and examined cross-domain relationships within Persian and within English and cross-linguistic associations across the two languages. Within the following sections I also examined the influences of language input and production on language performance. In this study *language input* is the average percentage of time Persian and English are spoken by parents, and *language production* is the average percentage of time Persian and English are spoken by the child. The specific aims of this study were to:

1. Compare the English language skills of Persian-English bilingual preschoolers living in the U.S. who attend a Persian heritage language immersion school and English monolingual children;
2. Evaluate the Persian and English vocabulary and morphosyntactic language skills of bilingual preschoolers;
3. Examine cross-domain relationships between vocabulary and morphosyntactic language skills within Persian and within English;
4. Examine cross-linguistic relationships between Persian and English language skills; and

5. Determine the relationships between Persian and English language skills, language input, and language production.

Predictions

For Specific Aim 1, I anticipated that the bilingual (BI) group as a whole would not perform significantly different than the English-only (EO) group on English receptive and expressive measures of vocabulary and morphosyntax. This prediction is based on studies such as Conboy and Thal (2006) and Thordardottir (2011). Conboy and Thal found no differences in Spanish and English vocabulary skills of simultaneous bilingual children, and children's grammar learning was paced by their vocabulary skills. Thordardottir found that French-English bilingual children who had equal exposure, or input, to their two languages performed similarly to monolinguals in each language, when matched for age, socioeconomic status, nonverbal cognition, and language status (i.e., both languages have equal status).

For Specific Aim 2, I anticipated that the bilingual children would demonstrate stronger performance on English tasks than on Persian tasks. This is in part because of the difficulty of acquiring heritage languages (Pearson, 2007) and because of the varying amounts of language input the children receive. Furthermore, the English tasks were not normed on populations like the BI group, and the accuracy of the Persian tasks had not yet been validated.

For Specific Aims 3 and 4, I anticipated strong cross-domain relationships between vocabulary and morphosyntax skills within Persian and within English, as previous studies have found (Conboy & Thal, 2006; Marchman et al., 2004; Parra et al., 2011). These studies have found that children with strong vocabularies tended to also

have strong syntactic skills. I also anticipated notable cross-linguistic relationships in lexical abilities based on the findings of Kan and Kohnert (2008) and Parra, Hoff, and Core's (2011).

For Specific Aim 5, I anticipated that variables extracted from the parent questionnaire (e.g., input of language from parents, language production by children) would show a positive association with task performance in each language. This prediction was based on findings by Hammer et al. (2009), Bohman et al. (2010), Thordardottir (2011; 2014), MacLeod et al. (2013), Willard et al. (2014). Because the children who participated in this study were primarily simultaneous language learners, exposed to Persian and English from birth, I did not anticipate age of exposure to each language being significantly related with language skills.

CHAPTER 4: Method

Participants

Participants included two groups of preschool children, Persian-English bilingual (BI) children and English-only speaking (EO) children.

Bilingual group (BI). Study inclusion criteria for the BI group were: a) attending a Persian immersion preschool, b) no indication of hearing loss, c) no diagnosed or suspected developmental or cognitive delays, and d) some level of Persian-English bilingual proficiency or at least six months enrollment in the Persian immersion preschool.

The BI participants were recruited from a Persian immersion school, the Golestan Center for Language Immersion and Cultural Education (hereafter referred to as Golestan) in Berkley, CA. At the time of this study, Golestan was the only known Persian immersion preschool program within the U.S. Golestan is a heritage Persian immersion preschool, serving 2- through 5-year-old children. Golestan's teaching approach is rooted in Montessori methods. The school's mission is to foster a knowledge of and respect for Iranian language and culture; the teachers and staff work to cultivate the children's development as active members of a diverse multicultural community. Teachers communicate with children exclusively in Persian. Children are expected to communicate in Persian, but are not reprimanded for speaking English. For example, if a child asks a question in English, the teacher would respond by repeating the child's question in Persian and answering the question in Persian.

I contacted the director and founder of Golestan, expressed interest in studying the language development of Persian-English bilingual children in the U.S., and queried

the director about supporting the study. Upon the director's agreement for Golestan to serve as the study recruitment and data collection site, I shared key study documents with the director (i.e., consent form, parent questionnaire, IRB approval). The director wrote a letter to parents expressing support of the study. I created a short, 2-minute video to introduce the study to the families of Golestan and to invite all families to participate. The director of the school distributed her letter of support and a link to the video to the families and staff of Golestan.

Recruitment packets were mailed to the Golestan director for distribution to the Golestan families; they contained an introductory letter, consent form approved by an institutional review board (IRB) at the University of Minnesota, and parent questionnaire. The introductory letter introduced the researchers again and briefly described the study. The consent form provided a more detailed explanation of the study and encouraged parents to contact the researcher with any questions or concerns. Parents were given the option to sign the consent form to permit their child's participation in the study, request more information, or decline participation. Parents who consented to participate in the study also completed a background and language questionnaire (see Appendix A). This provided information regarding basic demographic characteristics, family language habits, cultural practices, parents' perceptions of the child's language skills, and observed cognitive or developmental delay. Parents returned the packets to their children's teachers. Teachers forwarded the packets to the school's office manager who kept them in a secure location until the researchers' arrival at the school. Upon receiving the packets, I contacted parents who requested to be contacted. To answer questions that

arose, I was available to meet parents at Golestan during drop-off and pick-up times throughout the data collection period.

Parents of 19 BI children consented to be in the study. However, three of these children were excluded from study analyses: two children completed only a small subset of the study tasks and one child changed schools amid data collection. One additional child was excluded from the analyses for Specific Aim 5 because the parent questionnaire was incomplete. Table 1 contains a summary of the remaining 15 participants' demographic characteristics. The analysis sample included three 2-year-olds, four 3-year-olds, four 4-year-olds, and five 5-year-olds.

Table 1

BI and EO Group Participant Characteristics

	BI Group (n=15)	EO Group (n=17)
Age: min – max (years; months)	2;6 – 5;7	2;2 – 5;11
Female: male ratio	9:6	10:7
Maternal education		
High school	6%	12%
College	47%	53%
Graduate school	47%	35%
Starting age at current school: median (months)	27	24
Time spent at current school: min-max (months)	7– 41	1– 38
Household income		
$25,001 – $50,000	0%	6%
$50,000 – $100,000	13%	18%
$100,001 – $150,000	40%	41%
$150,001 +	47%	35%

All BI participants were born in the U.S. One child also spent time in Iran and Belgium, but was consistently exposed to Persian and English by his parents while abroad. The majority of children (82%) came from bicultural families (e.g., one parent

was Iranian or of Iranian descent and the other parent was American). Only two of the 15 families were of households with two Iranian parents. The majority of participants, 71% (10 of 14; 1 of the 15 parents did not answer this question), were simultaneous bilinguals, exposed to both Persian and English since birth. One child was exposed to Persian at birth and English at 18 months; three children were exposed to English at birth and Persian between 2 and 2.5 years following enrollment at Golestan).

English-only group (EO). Study inclusion criteria for the EO group were: a) attend an English-only school for most of their 'educational career,' b) no indication of hearing loss, c) no diagnosed or suspected development or cognitive delays, and d) less than one month of consistent exposure to another language.

The EO participants were recruited primarily from a school with similar educational practices as Golestan, All Stars Montessori (hereafter referred to as All Stars) in Apple Valley, MN. All Stars is a Montessori school that serves children from six weeks to six years of age.

I contacted the director of All Stars and expressed interest in studying the language development of English-speaking monolingual children as a part of the larger study. Upon the director's agreement for All Stars to serve as a study recruitment and data collection site, I shared key study documents with the director (i.e., consent form, parent questionnaire, IRB approval). The director wrote a letter to parents expressing support of the study.

EO participants were recruited using procedures nearly identical to those used to recruit BI participants. Packets were delivered to the school's director for distribution to the preschoolers' families, which included an introductory letter, consent form approved

by an IRB at the University of Minnesota, and parent questionnaire similar to the BI group questionnaire. Parents returned the packets to their children's teachers. The teachers forwarded the packets to the school's director who forwarded them to the research team. Upon receiving the packets, I contacted parents who requested to be contacted. To answer questions that arose, I was available to meet parents at All Stars during drop-off and pick-up times on specified dates. Seven EO participants did not attend All Stars. Parents of these participants heard about the study from a friend, whose child participated in the study. These parents contacted me individually and I directly sent the packet.

Parents of 17 EO children consented to be in the study. Table 1 contains a summary of the participant characteristics. The sample included 10 children who attended the Montessori preschool and 7 children who attended other schools in the Minneapolis-St. Paul area. The EO group included four 2-year olds, six 3-year olds, three 4-year olds, and four 5-year-olds. All participants came from monolingual English-speaking families.

Study Procedures

Parents completed a questionnaire and each child participant completed a battery of language tasks. One researcher and three research assistants collected all child data. I, the primary researcher, am a nationally certified speech-language pathologist, and proficient in Persian and English. I participated in data collection of both BI and EO groups. One research assistant, who helped with BI and EO data collection and coding, was an undergraduate student at the University of Minnesota and proficient in Persian and English. Another assistant, who collected BI participant data, was a PhD student at The Wright Institute in Berkeley, CA and proficient in Persian and English. The third

research assistant, who completed EO data collection and coding, was a master-level student at the University of Minnesota. All research assistants completed training on the study tasks prior to assisting in data collection.

For the BI group, participants completed the Persian and English language tasks on different days. With an individual child, the same researcher administered all Persian tasks and a different researcher administered all English tasks. One child was unavailable to be assessed while the research team was in California and thus, the California-based research assistant administered both the Persian and English tasks for that child. For both BI and EO groups, the research team worked with the participants' teachers or parents to find time in the day that was least disruptive to complete testing. Researchers provided breaks between tasks as needed with the option to play with toys of the child's choosing. When children became tired, researchers discontinued the session and continued testing at a later time or day. All sessions were audio recorded and/or video recorded for coding purposes. All children received hearing screenings to ensure adequate hearing ability; screenings were conducted at 1,000, 2,000, and 4,000 Hz at 25 dB HL per recommendations from the American Speech-Language-Hearing Association (American Speech-Language-Hearing Association, n.d.).

Parent Questionnaire

The parent questionnaire for the BI group requested basic demographic information and parent report of their child's language skills, such as when they were exposed to Persian and English languages, when they started using, or speaking, each language, how they rated their Persian and English skills, and how much Persian and English their children understood. Parents also described how much they spoke Persian

and English to their child (i.e., language input), and how much Persian and English their child spoke in different settings (i.e., language production). The questionnaire was modeled after Kan (2008), Pham (2011), and McLinden (2011).

Language input for the BI group was calculated as the percentage of time that parents reported speaking to their child in Persian and/or English. Percentages were weighted according to weekdays and weekends and averaged across each pair of parents to get one Persian and one English percentage for the pair of parents. For example, if one parent spoke Persian 60% of the time and English 40% of the time over the course of a week, and the second parent spoke Persian 90% of the time and English 10% of the time over the course of a week, then this child heard Persian 75% of the time from their parents and English 25% of the time. English input was calculated similarly.

Language production was calculated as the percentage of time that children spoke Persian and English across specified settings. These settings included: at home (weekdays & weekends), at school, when reading, when writing, with parents, with grandparents, with siblings, with friends, when watching TV/videos, and any additional settings the parent wanted to include. School was included because several parents indicated that their children spoke some English at school with their friends (e.g., playing outside). Parents reported percentages for each setting and each language. An average of these percentages for each language created the child's overall percentage of Persian and English productive use.

The questionnaire also requested parents to describe cognitive and language development. The researchers used these questions to confirm that there were no developmental or cognitive delays. Parents of children in the EO group completed a

condensed questionnaire requesting basic demographic information, including their child's language abilities. Appendix A contains the complete BI parent questionnaire.

Language Tasks

The battery of linguistic tasks is listed in Table 2. Each task included Persian and English versions (see Appendix B for sample items from Persian protocols). A series of English tasks was chosen to assess receptive and expressive vocabulary and morphosyntactic language skills. The Persian measures were interpreted versions of the same English tasks and were carefully created to account for cultural and linguistic differences. Each task went through several rounds of reviews to ensure accuracy. First, I interpreted all items from English to Persian. Then, three Persian-English bilingual speakers, who were all native Persian speakers, judged the interpretations and made suggestions as necessary. The reviewers for each task included one of the primary researcher's family members, a special education teacher from Minneapolis with graduate training from a university in Iran, and one of several faculty members from a Persian language department in the U.S.

Table 2

Language Tasks

Task	**Domain**
Vocabulary	
Expressive One Word Picture Vocabulary Test (EOW)	Expressive
Receptive One Word Picture Vocabulary Test (ROW)	Receptive
Morphosyntax	
Sentence Repetition subtest of CELF-P:2 (CELF-SR)	Expressive
Sentence Structure subtest of CELF-P:2 (CELF-SS)	Receptive

Note. CELF-P:2 is Clinical Evaluation of Language Fundamentals – Preschool, 2nd Edition.

Vocabulary tasks. Researchers administered the Receptive and Expressive One Word Picture Vocabulary Tests (ROW: Brownell, 2001; EOW: Brownell, 2000) per publishers' standardized procedures (i.e., suggested starting age, basal, and ceilings). These tests are designed to assess receptive and expressive vocabulary skills in children over the age of 2 years. The tests yield raw scores, which reflect the number of items an individual responds to correctly. I utilized raw scores, as opposed to the standard scores, for current study analyses because BI participants were not comparable to the tests' norming samples, and to allow for comparison of Persian and English scores. For the study analyses, the ROW and EOW raw scores were combined to create a single vocabulary score.

For the ROW, a researcher said a word and asked the participant to select a picture from a field of four pictures that best matched the word. Items were administered

from suggested starting points according to age, and the task was discontinued when participants reached the test ceiling (i.e., six incorrect items within an eight-item range). Some Persian items (six items) did not have one-word translation equivalents. In these cases, the researcher used the two- or three-word translations. For example, the English word *mailing,* as in "mailing a letter," became the compound verb *post kardan* or "to mail" (as a noun plus "to do"). Additionally, seven of the English items did not have a Persian equivalent referent. For example, the English word *core* is described in Persian as "the middle of the apple," and *hood* (i.e., hood of a sweater), is referred to simply as "a hat." These items were excluded.

For the EOW, a researcher asked the participant to name pictures. Items were administered from suggested starting points according to age, and the task was discontinued when participants reached the test ceiling (i.e., six consecutive incorrect items). All items from the EOW had translation equivalents. Some had more than one appropriate label, not unlike the English. For example, the item "cat" had several translations, *pishi, gorbeh,* and *bache gorbeh.* All were considered acceptable, just as "kitten" and "kitty" are both considered acceptable in English.

Morphosyntactic tasks. Two subtests from the Clinical Evaluation of Language Fundamentals – Preschool – 2nd Edition (CELF-P,2; Semel, Wiig, & Secord, 2004) were administered per protocol. The Sentence Structure (CELF-SS) and Recalling Sentences (CELF-RS) subtests are used to evaluate receptive and expressive morphosyntactic skills, respectively, in 3- through 6-year old children. The subtests yield raw scores based on the number of items to which an individual responds correctly. Similar to the vocabulary

measures, the current study used raw scores for analyses. Raw scores of the two morphosyntactic tasks were combined to create a single morphosyntax score.

For the CELF-SS, the researcher read a sentence and asked the participant to match it to the correct picture from a field of four. The subtest consists of 22 items, but the subtest was discontinued if a child reached the ceiling of five consecutive incorrect responses. The Persian interpretations matched the English sentences in number of words and morphemes. Seven items (of 22) were identical in number of words, and four items were identical in number of morphemes. For the remaining items, most were within one to two morphemes of each other (13 of 18) or within one to two words of each other (10 of 15). On average, English sentences had 1.20 morphemes per word, while Persian had 1.41 morphemes per word. This difference in average number of morphemes per word is consistent with Persian's morphologically rich language structure.

For the CELF-RS, a researcher read a sentence and asked the participant to repeat it verbatim. The subtest consists of 13 items, but the subtest was discontinued if a child reached the ceiling of three consecutive sentences scored as zero (i.e., or four or more errors in one sentence). The Persian interpretations matched the English sentences in number of words and morphemes. Five items (of 13) were identical in number of words and three items were identical in number of morphemes. For the remaining items, five English items had more morphemes and five Persian items had more morphemes, but most of these (7 of 10) were within one or two morphemes of each other. The average number of morphemes per word was 1.17 for the English sentences and 1.4 morphemes per word for the Persian sentences.

The CELF-RS was scored online first and then checked from transcribed audio files. Audio files were transcribed and scored by two research assistants to allow for reliability (i.e., 100% consensus). Two English-speaking researchers transcribed the English files, and two Persian-English bilingual researchers transcribed and scored the Persian files. We compared scores and went over discrepancies to obtain a consensus transcription with 100% agreement.

CHAPTER 5: Statistical Analyses

For the statistical analyses of this study, the children's performance on the language tasks was combined to form four composite scores: vocabulary, morphosyntax, receptive, and expressive. Raw scores from the tasks were combined as follows to create the composites: vocabulary - EOW and ROW raw scores, morphosyntax - CELF-RS and CELF-SS raw scores, receptive - ROW and CELF-SS raw scores, and expressive - EOW and CELF-RS raw scores.

Specific Aim 1

To compare the English language skills of Persian-English bilingual (BI) and English-only (EO) monolingual children, I examined the median and variability for the four English composites using the Wilcoxon Rank Sum test. This non-parametric test is suitable for small samples and when the data do not meet parametric assumptions. In addition to the Wilcoxon test, mean ranks were calculated to determine the directionality of effects.

Specific Aim 2

To descriptively evaluate the Persian and English vocabulary and morphosyntactic language skills of the BI and EO groups, I utilized basic statistical methods to determine the group mean, standard deviation, and range. The Wilcoxon Rank Sum test was used to compare the BI participants' Persian and English scores and mean ranks were calculated.

Specific Aims 3 & 4

To examine cross-domain relationships between vocabulary and morphosyntactic language skills within Persian and within English, and to examine cross-linguistic

relationships between Persian and English language skills, I used correlational analyses. For Specific Aim 3, correlations were carried out across the domains within each language, and for Specific Aim 4, correlations were carried out across Persian and English within the respective domains.

Specific Aim 5

To determine the relationships between Persian and English language skills, language input (i.e., average percentage of time Persian and English spoken by parents), and language production (i.e., average percentage of time Persian and English spoken by the child), I used a series of visual and correlational analyses. To further examine the relationships between performance on language tasks, language input, and child language production, the plots were coded by shape based on which language each pair of parents spoke more or which language the child spoke more.

CHAPTER 6: Results

Before examining task performance by the BI and EO groups, I examined the relationship between chronological age and language performance. Correlational and regression analyses revealed that both Persian and English scores increased as age increased. Regression analyses indicated that age significantly predicted composite Persian scores ($R^2 = 0.63$, $F(1, 13) = 22.38$, $p < .001$) and composite English scores ($R^2 = 0.65$, $F(1, 14) = 26.53$, $p < .001$). Persian vocabulary ($R^2 = 0.53$, $F(1, 16) = 18.11$, $p < .001$) and morphosyntax ($R^2 = 0.57$, $F(1, 13) = 17.19$, $p < .001$) composite scores and English vocabulary ($R^2 = 0.63$, $F(1, 14) = 24.10$, $p < .001$) and morphosyntax ($R^2 = 0.52$, $F(1, 14) = 15.20$, $p < .001$) composite scores were also significant. Given the strong relationship between age and language performance, in the following analyses 'Age' served as a covariate.

Specific Aim 1: Comparison of Bilingual Preschoolers to Monolingual Peers

Performance on Persian and English tasks for the BI group and English tasks for EO group are included in Table 3. The mean English composite (i.e., sum of raw scores of all English tasks) for the BI group was 115 and for the EO group was 119. The Wilcoxon Rank Sum test indicated no significant group differences ($p = .90$; BI mean rank = 16.97, EO mean rank = 18.03). Wilcoxon tests also revealed no significant group differences for any of composites (*p*s: .52 - .88).

Table 3

Descriptive Statistics for Language Tasks for BI and EO Groups

	BI Group			*EO Group*		
English Tasks	**Mean**	**SD**	**Min-Max**	**Mean**	**SD**	**Min-Max**
Composite	115	44	41 – 189	119	52	33 – 122
Vocabulary	88	31	33 – 152	96	40	32 – 172
Morphosyntax	27	15	8 – 47	23	14	1 – 50
Expressive	55	24	13 – 93	55	27	16 – 108
Receptive	60	20	28 - 96	64	25	16 - 114
Persian Tasks						
Composite	92	43	19 – 164			
Vocabulary	68	29	13 – 122			
Morphosyntax	27	14	4 – 45			
Expressive	37	23	2 - 81			
Receptive	58	21	17 - 86			

Specific Aim 2: Persian and English Vocabulary and Morphosyntactic Language Skills of Bilingual Preschoolers

Table 3 (from Specific Aim 1) contains the BI group's English and Persian composite scores. The Wilcoxon signed rank test indicated a significant difference between the participants' combined Persian composite scores and combined English composite scores ($p < 0.01$; Persian mean rank = 15.59, English mean rank = 19.41). The domain composite comparisons revealed significant differences between the Persian and

English vocabulary tasks ($p < 0.01$; Persian mean rank = 13.13, English mean rank = 19.88) and the Persian and English expressive tasks ($p < 0.01$; Persian mean rank = 11.83, English mean rank = 19.17). Performance on the English vocabulary tasks was significantly better than on the Persian tasks. The morphosyntactic and receptive Persian–English comparisons were not significant (ps = .31 and .17, respectively).

Specific Aim 3: Cross-Domain Relationships Within One Language

In Persian, there were strong positive correlations between the vocabulary and morphosyntax (r = 0.83, $p < .001$) and the expressive and receptive composites (r = 0.86, $p < .001$). Participants who had strong vocabulary skills had strong morphosyntactic skills; participants who had strong receptive language skills had strong expressive language skills. In English, participants with strong vocabulary skills also had strong morphosyntax skills (r = 0.79, $p < .001$); participants with strong receptive skills also had strong expressive skills (r = 0.95, $p < .001$).

For comparison, the cross-domain relationships were also analyzed for the EO group's English scores. There were strong positive correlations between the vocabulary and morphosyntax composites (r = 0.87, $p < .001$) and the expressive and receptive composites (r = 0.95, $p < .001$). These relationships were comparable to the BI group.

Specific Aim 4: Cross-Linguistic Relationships

Cross-linguistic analyses between Persian and English for the BI group revealed significant positive relationships between all composites. Specifically, participants with high Persian vocabulary composites also had high English vocabulary (r = 0.68, $p < .01$) and morphosyntax (r = 0.59, $p < .01$) composites. Likewise, participants with high

Persian morphosyntax composites also had high English vocabulary (r = 0.79, $p < .001$) and morphosyntax (r = 0.79, $p < .001$) composites.

Furthermore, strong positive correlations were also found between the expressive and receptive measures. Participants with high Persian receptive language composites also had high English receptive (r = 0.80, $p < .001$) and expressive (r – 0.71, $p < .01$) language composites. Similarly, participants with high Persian expressive language composites also had high English receptive (r – 0.77, $p < .001$) and expressive (r = 0.70, $p < .01$) language composites.

Specific Aim 5: Language Input and Language Production

Table 4 contains descriptive data on language input and production for the BI group. On average, participants in the BI group spent nearly 29 hours a week at Golestan beginning around 2.5 years of age. Most participants (71%) were exposed to both Persian and English from birth. The mean for age of exposure to Persian was slightly higher than the mean age of exposure to English. Three participants were not exposed to Persian until they enrolled at Golestan between 2 to 2.5 years of age. On average, parents provided slightly more English input than Persian to their children. Parents ranged from speaking Persian 90% of the time at home to speaking English 98% of the time, providing a wide range of parental language input. On average, participants spent more time speaking Persian than English. The following sections will look at results regarding parental language input and child language production and language performance on tasks while controlling for age. While there are notable trends, none of the correlations reached significance.

Table 4

Descriptive Data for Language Environment for BI Group

	Persian		***English***	
	Mean (SD)	Min-Max	Mean (SD)	Min-Max
Age (months)	48.3 (13.6)	24-67		
Starting Age at Golestan (months)	31.5 (9.6)	22-62		
Age of Exposure to Language (months)	3.9 (9.6)	0-27	1.4 (4.9)	0-18
Percentage of Time Language Spoken by Parents	46% (28.3)	0%-90%	52% (26.0)	10%-98%
Percentage of Time Language is Spoken By Child	53% (22.8)	14%-97%	44% (21.6)	3%-86%

Percentage of time Persian spoken by parents. Figure 2 displays the BI participants' raw vocabulary, morphosyntax, expressive, and receptive composite scores by average percent of time Persian was spoken by their parents. Inspection of the graphs revealed that the Persian language scores increased as the percent of time Persian was spoken by parents increased. In contrast, English scores decreased as the percent of time Persian was spoken by parents increased, particularly on the morphosyntax composite.

After controlling for age, Pearson correlations between Persian composite raw scores and the average percent of time Persian was spoken by parents were positively, but not strongly, correlated. Correlations are as follows: vocabulary ($r = 0.35$), morphosyntax ($r = 0.27$), expressive ($r = 0.42$), and receptive ($r = 0.28$). Scores on the English language

measures were slightly negatively, but not significantly, correlated with the percentage of time Persian was spoken by parents, with the strongest correlation being with the English morphosyntax composite ($r = -0.30$). Correlations for the remaining composites are as follows: vocabulary ($r = -0.17$), expressive ($r = -0.27$), and receptive ($r = -0.17$).

In Figure 2 participants are coded based on time spent speaking Persian and English. Participants who spoke English more than 50% of the time are marked with triangles. Participants who spoke Persian more than 50% of the time are marked with circles. Inspection of this figure revealed that participants who spoke English more frequently tended to perform below the mean on the Persian language tasks and were equally dispersed on the English tasks. Participants who spoke Persian more frequently tended to perform above the mean on the Persian language tasks. Consequently, it appeared that the participants who spent more time speaking Persian and whose parents spoke Persian more frequently had the strongest performance on the Persian tasks.

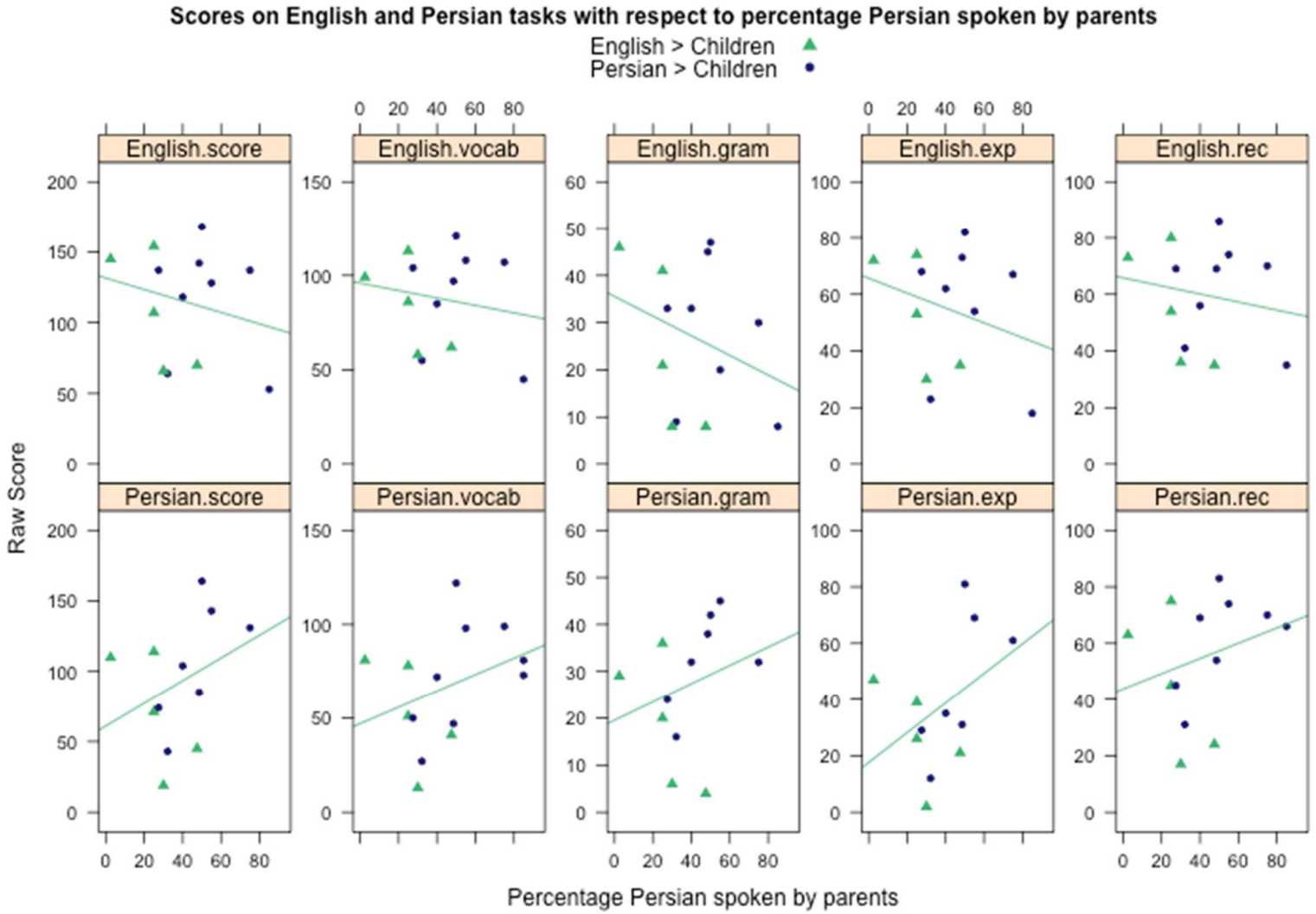

Figure 2. Raw Scores on Persian and English Tasks with Respect to Parental Persian Input.

Percentage of time English spoken by parents. Figure 3 displays the BI participants' raw vocabulary, morphosyntax, receptive, and expressive composite scores by average percent of time English was spoken by their parents. Inspection of the figure revealed that as the time parents spoke English increased, children's English composite scores increased and Persian scores decreased. This trend appeared strongest for expressive language tasks.

Pearson correlations for Persian raw scores and the average percentage of time English was spoken by parents revealed negative correlations, particularly for expressive composite ($r = -0.42$) and vocabulary composite ($r = -0.35$), and slightly less so for the receptive composite ($r = -0.28$) and morphosyntax composite ($r = -0.27$) scores. Correlations with English scores were positive, indicating that children whose parents spoke English for a greater percentage of time, tended to perform better on English tasks, specifically expressive composite ($r = 0.27$) and morphosyntax composite ($r = 0.30$) scores, and less so for receptive composite ($r = 0.17$) and morphosyntax composite ($r = 0.17$) scores.

In Figure 3, participants are coded in a similar manner as in Figure 2. Participants who spoke English greater than 50% of the time are marked with a triangle. Participants who spoke Persian more than 50% of the time are marked with a circle. Inspection of Figure 3 revealed that participants who spoke English less than half of the time did better on the Persian tasks than those participants who spoke English greater than 50% of the time and whose parents spoke English a greater percent of time. On the English tasks, the children who spent more time speaking Persian performed comparably to the children who spent more time speaking English.

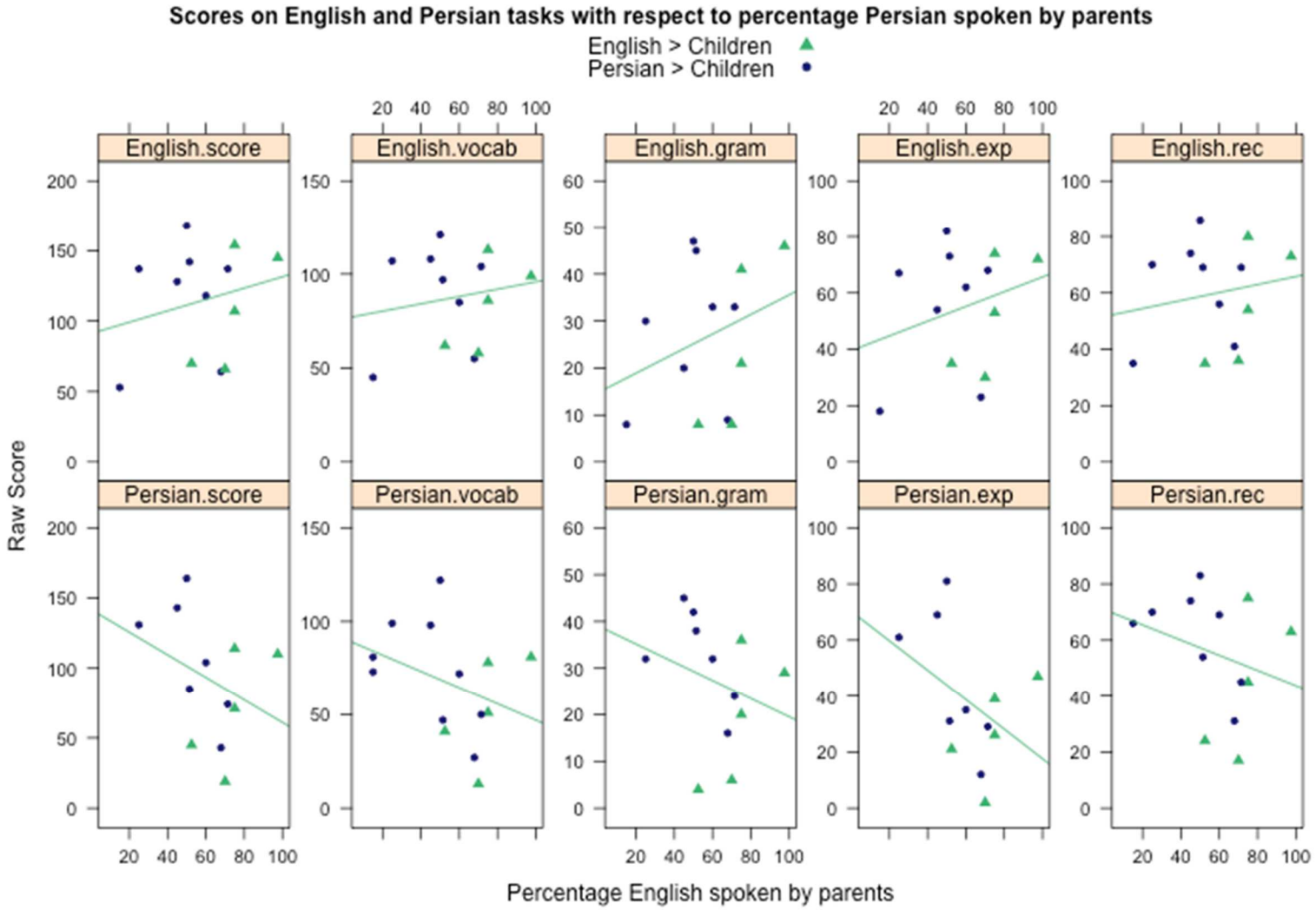

Figure 3. Raw Scores on Persian and English Tasks with Respect to Parental English Input.

Percentage of time Persian spoken by participants. Figure 4 displays the BI participants' raw vocabulary, morphosyntax, expressive, and receptive composite scores by average percent of time Persian was spoken by the participants. Inspection of Figure 4 revealed a positive relationship between the amount of time Persian was spoken by the participants and Persian composite scores. Participants who spoke Persian for a greater percent of time tended to have higher Persian scores and slightly lower English scores.

Pearson correlations for Persian composite raw scores and the percent of time Persian was spoken by the participants revealed positive correlations, particularly for the expressive language tasks ($r = 0.38$) and morphosyntax tasks ($r = 0.40$), and less so for the receptive composite ($r = 0.31$) and vocabulary composite ($r = 0.33$) scores. There were negative correlations between English composite scores and the percent of time Persian was spoken by the participants, with the strongest of the correlations being expressive composite score ($r = -0.17$). The following correlations with percent of time Persian spoken by parents and English scores are as follows: receptive composite ($r = -0.17$), vocabulary composite ($r = -0.13$), and morphosyntax composite ($r = -0.14$).

Participants are coded in Figure 4 based on the percent of time parents spoke English and Persian. Participants whose parents spoke Persian more than 50% of the time are marked with a circle. Participants whose parents spoke English more than 50% of the time are marked with a triangle. Inspection of the figure revealed that participants parents spoke Persian a greater percentage of time were more likely to perform above the mean on Persian tasks and participants whose parents spoke English a greater percentage of time were more likely to perform below the mean.

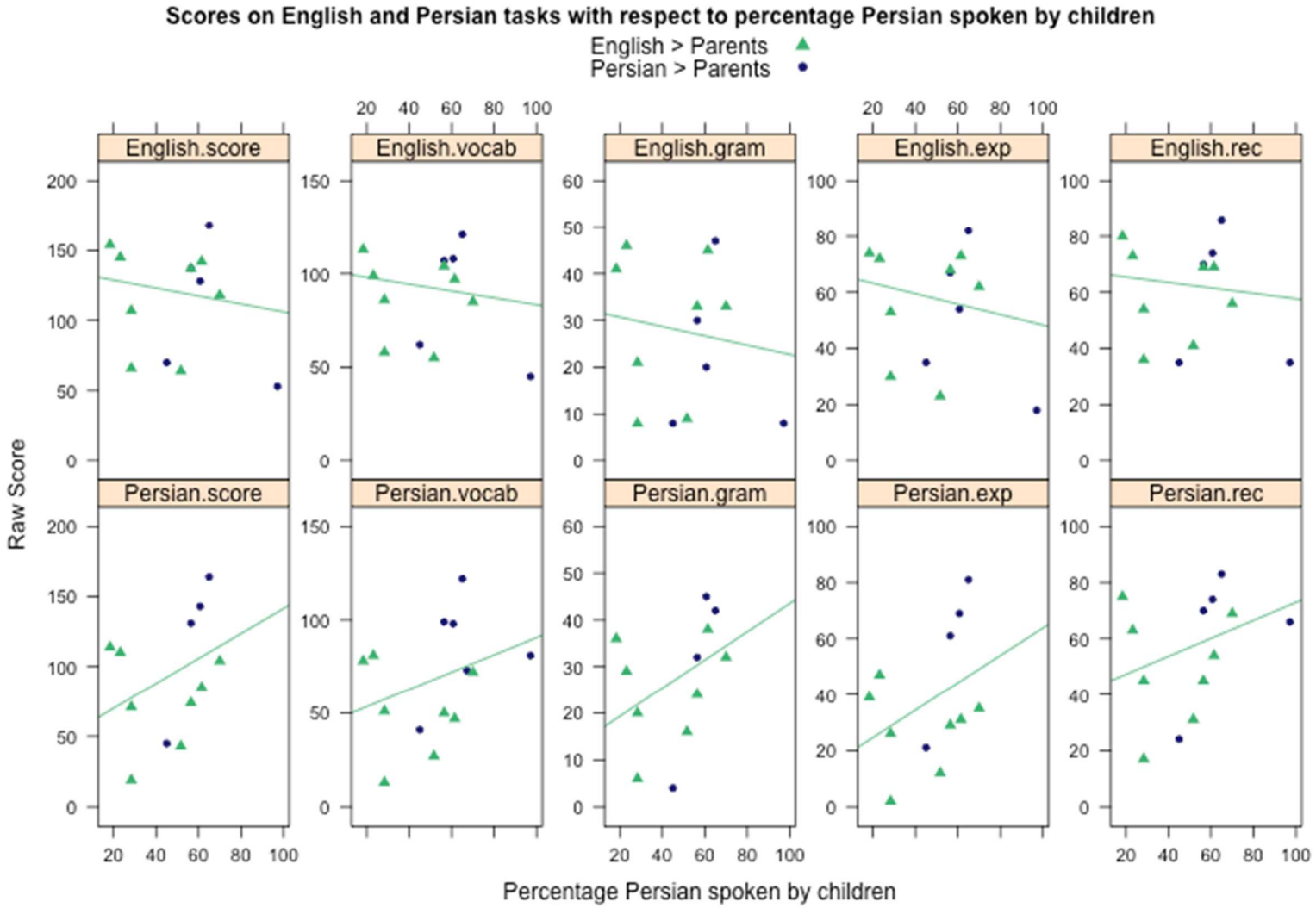

Figure 4. Raw Scores on Persian and English Tasks with Respect to Persian Child Production.

Percentage of time English spoken by participants. Figure 5 displays the BI participants' raw vocabulary, morphosyntax, receptive, and expressive composite scores by average percent of time they spoke English. Inspection of the Figure 5 revealed that the percent of time English was spoken by the participants had a slight positive relationship with English language skills. The other groups of tasks did not appear to have a noticeable positive relationship with the percentage of English spoken. Additionally, the amount of English spoken by participants appeared to have a negative relationship with Persian language skills.

Pearson correlation analyses for the Persian raw composites and the percent of time English was spoken by the participants revealed negative correlations. These correlations were moderate on all composites and are as follows: expressive composite ($r = -0.45$), receptive composite ($r = -0.45$), vocabulary composite ($r = -0.39$), and morphosyntax composite ($r = -0.58$) scores. This indicates that the more time participants spent speaking English, the lower their Persian scores tended to be. On the other hand, the correlations with English scores were weak and are as follows: expressive composite ($r = 0.10$), receptive composite ($r = 0.01$), vocabulary composite ($r = 0.05$), and morphosyntax composite ($r = 0.06$) scores.

Participants in Figure 5 are coded such that participants whose parents spoke Persian more than 50% of the time are marked with a circle and participants whose parents spoke English more than 50% of the time are marked with a triangle. Inspection of this figure revealed that participants whose parents spoke Persian for a greater amount of time were more likely to perform above the mean on Persian tasks. Participants whose

parents spoke English for a greater amount of time were more likely to perform below the mean on Persian tasks.

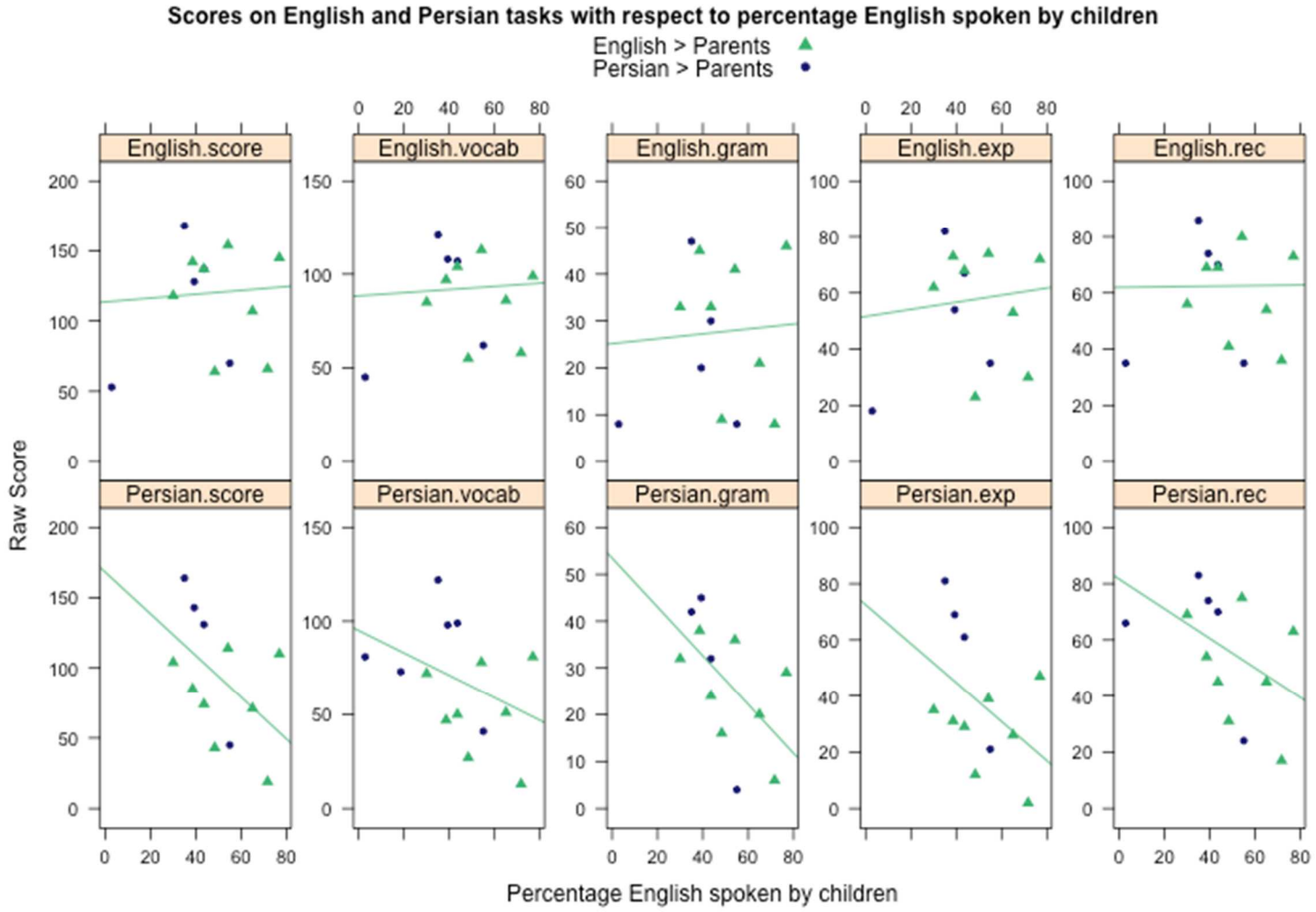

Figure 5. Raw Scores on Persian and English Tasks with Respect to Child English Production.

CHAPTER 7: Discussion

The overarching purpose of this study was to gain a better understanding of the language skills of typically developing Persian-English bilingual preschoolers living in the U.S. The specific study aims were to: a) compare the English skills of bilingual and monolingual preschool children, b) compare the Persian and English vocabulary and morphosyntactic skills of bilingual children, c) examine within-child associations between vocabulary and morphosyntax for English and Persian, d) examine relationships between Persian and English language skills, and e) evaluate the relationships between parental language input and children language production.

Specific Aim 1: Comparison of Bilingual Preschoolers to Monolingual Peers

The first series of analyses compared the BI and EO groups' English skills. I hypothesized that the bilingual children's skills would not be significantly different than age-matched monolingual peers. Previous research indicates that bilingual children growing up in the U.S. have comparable English skills to their monolingual counterparts when matched for socio-economic status (Pearson et al., 1993; Petitto et al., 2001). It should be noted that some research shows that for younger bilingual children, when comparing bilingual children's vocabulary skills to their monolingual peers equitably, it is necessary to evaluate their conceptual vocabulary (i.e., vocabulary knowledge in both languages), as opposed to their vocabulary skills in one language (Goldstein, 2006; Pearson et al., 1995). Because the English language assessments used in this study were designed for and normed on monolingual English-speaking children, the bilingual children's performance could potentially underestimate their true language abilities.

The differences between the BI and EO groups' English performance were not statistically significant. These results suggest that within this particular BI group, non-English education (i.e., heritage language immersion) at the preschool level is not harmful to children's English language, nor is exposure to two languages in the home. It is clear that the BI group is continuing to learn English irrespective of the large amounts of time the child is spoken to in Persian and speaks Persian. The results from this study confirm findings from previous research (Pearson, 2007; see Tedick et al., 2011), which show that typically developing children in the U.S. will learn English via education, media, and the greater community. Pearson et al. suggest in their 1997 study, that even in a Spanish-speaking community such as Miami, it may be harder for a child to learn Spanish as opposed to English.

Specific Aim 2: Persian and English Vocabulary and Morphosyntactic Language Skills of Bilingual Preschoolers

When comparing the BI group's Persian and English language skills, I hypothesized that their English language skills would be stronger than their Persian language skills. This prediction was based on previous research, which suggests the resilience of English in typically developing children in the U.S. (MacLeod et al., 2011; Paradis, 2009; Patterson, 2002; Pearson, 2007). Results revealed that the BI group performed significantly better on the English tasks than on the Persian tasks. This in part corroborates Specific Aim 1 and provides further evidence that children who receive a considerable amount of non-English language input in preschool do not appear to be disadvantaged in their ability to learn English. Moreover, findings from Specific Aims 1 and 2 provide further support that typically developing preschoolers are able to learn two

languages. In the current study, despite the amount of Persian input from parents and Persian language production by children, English remained the stronger language based on the measures of vocabulary and morphosyntax tasks used in this study.

The BI group's stronger performance in English over Persian was somewhat expected given that previous researchers have studied and discussed the relative difficulty in which heritage languages grow as compared to English in the U.S.

Considering Pearson's statement on the difficulty of learning Spanish even within a Spanish-speaking community (2007), it is important to note that Spanish is the most widely spoken heritage language in the U.S. and is spoken by 13% of the U.S. population over the age of 5 years (U.S. Census Bureau, 2012). By comparison, there are much fewer Persian speakers in the U.S. and very few places in the U.S. where Persian is spoken in high percentages by the greater community, as Spanish is in a city like Miami. This means that Persian-speaking children will have less Persian input from the greater community, putting greater demands on parents and other external sources to provide adequate language input to support the heritage language (Bayley, Schecter, & Torres-Ayala, 1996; Pearson, 2007; Wastie, 1994). However, as described in Chapter 2, there are socioeconomic differences in the Persian-speaking community as compared to other minority language speaking communities. Researchers have found differences in heritage language communities based on parental socioeconomic and education factors (e.g., Hart & Risley, 1992). Thus, the relationship between parent and community language input and socioeconomic status, particularly for Persian speakers, requires further investigation.

Specific Aim 3: Cross-Domain Relationships Within One Language

In another series of analyses, I examined the relationships in the BI group between vocabulary and morphosyntactic language skills within Persian and within English. I predicted that the BI group would present with strong cross-domain relationships within each language as has been found in other studies of bilingual language development, such as the simultaneous Spanish-English bilingual children in Marchman et al. (2004), and the sequential Hmong-English bilingual children in Kohnert et al. (2010). Marchman et al. found stronger relationships between vocabulary and morphosyntax (i.e., MLU) domains within each language. Kohnert et al. found that similar relationships between vocabulary and morphosyntax (i.e., MLU) were stronger in English and more modest in Hmong, yet still statistically significant. Current study results indicated strong, positive, and significant relationships across the vocabulary and morphosyntax domains within both Persian and English, supporting the prediction. These results provide support for the notion that children use language experiences in each language to build the respective language (e.g., Persian grammar builds from Persian vocabulary).

Specific Aim 4: Cross-Linguistic Relationships

In addition to relationships across domains within each language, this study examined relationships in the BI group across languages. Specifically, the vocabulary and morphosyntax domains were examined across Persian and English. I hypothesized that the BI group would demonstrate cross-linguistic relationships akin to other bilingual groups, such as the sequential Hmong-English bilingual children in Kan and Kohnert (2008) and Kohnert et al. (2010) and the simultaneous Spanish-English bilingual toddlers

in Parra et al. (2011). Although each study found positive relationships, the children's languages and language domains assessed varied across studies. For example, Kan and Kohnert (2008) found positive relationships between Hmong receptive vocabulary and English expressive vocabulary. Kohnert et al. (2010) found positive cross-linguistic relationships between Hmong and English morphosyntax skills (i.e., measures of morphosyntax in a story retell) in children who attended a bilingual school. Parra et al. (2011) found significant positive cross-linguistic relationships in children's vocabulary across Spanish and English, in addition to the cross-domain relationships between vocabulary and morphosyntax within each language. Thus, the strong, positive, and significant relationships across languages from the current study expand on the evidence for cross-linguistic relations to Persian-English vocabulary and morphosyntax. Moreover, these findings further support some level of interdependence between languages. The fact that the relationships are positive reveals a supportive connection between languages, as opposed to one language having adverse effects on the other.

Specific Aim 5: Language Input and Language Production

The analyses related to this specific aim examined how varying amounts of language input from parents and language production by the child are associated with vocabulary and morphosyntactic language skills. I predicted that the percent of time parents spoke Persian and English to their children and the amount of time children spoke Persian and English would be positively related to their vocabulary and morphosyntactic language abilities in each language. Specifically, that greater Persian parental language input and greater child language production would be positively related with Persian

language skills and greater English input and production would be positively related with English language skills.

Before the results of input and production can be considered, it is important to discuss the relationship between language performance and age. For the English tasks, I anticipated that performance on the standardized, norm-referenced assessments would increase with age, such that the older children would earn higher raw scores than the younger children. In contrast, the Persian tasks were created specifically for this study and had never been used before. Therefore, it was important to validate that task performance improved as age increased, similar to the English tasks. The study results do indicate that Persian scores improved with age. Despite the significant correlations between performance on the Persian language tasks, further testing is required for validation of the newly developed tasks to detect language growth. It is important to note that the results discussed in the remainder of this section are not statistically significant.

Persian language input. The current study results demonstrate that the percent of time parents speak to their children in Persian is closely related to their children's Persian and English language skills. Because greater parental amount of Persian input was related to stronger child Persian language skills, particularly on expressive language tasks (EOW and CELF-RS), it is likely that parental input support children's Persian language development. In this case the child is exposed to more good examples of Persian language, which provides the child with greater opportunities to practice Persian and leads to stronger Persian language skills.

In contrast, greater Persian parental input may somewhat decelerate, but not obstruct the learning of English language development. In this study, there were small,

negative relationships between Persian parental input with English scores, particularly on the morphosyntax tasks (CELF-RS and CELF-SS) and the expressive tasks (CELF-RS and EOW). These relationships do not imply that children who receive more Persian language input are performing poorly on English language tasks, but rather that children who hear more Persian may not perform as well on English tasks as those who receive more English language input.

English language input. Study results also demonstrate that percent of time parents speak English with their children relates to Persian and English language skills differently. The amount of English input has a moderate, negative relationship with Persian language skills, primarily with the expressive language tasks (i.e., based on EOW and CELF-RS tasks) and morphosyntax skills (i.e., based on CELF-RS and CELF-SS tasks). This relationship is strongest based on the two expressive measures, which may be indicative of greater difficulty in expressive language tasks than receptive language tasks. Typically, receptive language develops before expressive language skills. In this case, the less Persian the children hear, the less they have the chance to practice, which may lead to poorer Persian expressive language skills.

Additionally, the amount of parent English input is likely to have a positive effect on child English language skills. However, the relationship between the percent of time English is spoken by parents and child performance on English tasks appears to be weaker that the effect of percent of time English is spoken by parents with Persian language skills. This may be because English scores are already somewhat higher than Persian scores, so there may not be as much room for improvement on English skills.

The positive relationships between Persian parental input and child Persian language skills are similar to the relationships found by Willard et al. (2014) in which the researchers found a positive relationship between the amount of Turkish spoken by mothers at home and children's Turkish vocabulary. The slight negative relationship between Persian parental input and English language skills are similar to the relationships found by Place and Hoff (2011) in which the researchers found English input to be negatively related to Spanish vocabulary and grammar, and Spanish input to be negatively related to English vocabulary and grammar. The closer association between the heritage language input and heritage language skills compared to these relationships in the majority language may be due to a vulnerability particular to heritage languages. As the non-majority language, Persian may be more susceptible to input influences, than English, the majority language; with more Persian input, the children perform better on the Persian language tasks, but with less Persian input (and more English), they perform less well on the Persian tasks. Thus, in the current study, greater Persian input may have improved the children's Persian language performance while not greatly affecting their English language performance. In contrast, greater English input could be truly disadvantageous to their Persian skills.

Persian language production. The results of the current study demonstrate that language production by children in Persian differently affects Persian and English language skills. The percentage of time that Persian is spoken by children has a positive relationship with their performance on the Persian tasks. As children speak more Persian, they tend to perform better on the Persian tasks. Therefore, aside from their time at

Golestan, which is spent with native-speakers of Persian, the amount of Persian they speak outside of school influences their Persian language skills.

In contrast, the percentage of time that Persian is spoken by children has a negative relationships with English task performance. However, this relationship is not as strong as the negative relationship between parental time spent speaking Persian and child performance on the English language tasks. The weakness of this negative relationship further demonstrates the resilience of English, the majority language (MacLeod et al., 2011; Paradis, 2009; Patterson, 2002; Pearson et al., 1997). Similar to the relationships between parental Persian input and English language performance, this resiliency may be because the children have stronger English skills overall.

English language production. The percent of time that children speak English has a negative relationship with their performance on the Persian language tasks. This relationship is the strongest of all the relationships between parental input, child production, and language performance on the Persian and English tasks. The more English the children speak, the lower their Persian scores tend to be. This is true of all domains and modalities (i.e., composite score, vocabulary, morphosyntax, expressive, and receptive). Thus, it appears that time spent speaking English by children has the strongest influence on Persian language skills. Assuming that, relative to English language skills, Persian language skills are more vulnerable to change, whether positive or negative, then a child would need greater production to support Persian language development.

In contrast, the amount of time that children speak English does not have a relatively strong relationship with English language scores. Children who speak more

English may perform somewhat better on English tasks, though these were the smallest correlations of the group. In other words, this BI group's English skills seem unchanged regardless of the amount of English they speak. Again, this may go back to the idea that they might have less room to improve in terms of language skills, because they are already performing on par with monolingual English-only speaking children (per the EO group and norms from the standardized tasks).

Overall, the relationships in the current study between the percent of time that children speak each language and children's language skills is similar to findings by Bohman et al. (2010) in which greater language production in each of a bilinguals languages was related to higher semantic and morphosyntactic abilities within the same language. The results from the current study also support the aforementioned theories of Pearson (1997) and Kohnert (2013), which suggest that input and production play important roles in the linguistic development of bilingual children. Despite the lack of significance in the input and production analyses, there are notable trends that suggest that the heritage language (i.e., Persian) is more vulnerable and requires greater support than the majority language (i.e., English). Given that the children performed well on both the English and Persian tasks, but that there was a negative relationship between English input by parents and Persian language skills, it appears that it is important to actively support heritage language development by maximizing language input (Pearson et al., 1997).

Across all the analyses, study results consistently suggest that greater heritage language support is beneficial for bilingual children and not detrimental to language development of the majority language, English. Other studies have confirmed that greater

input of the heritage language is necessary for it to be comparable to the language of the majority community (Pearson et al., 1997; Vihman, Lum, Thierry, Nakai, & Keren-Portnoy, 2006). This may be because of the constant presence of the majority language in the community (e.g., watching TV, at stores) (Pearson, 2007).

It is also important to note that for Persian-American families, the Persian language is considered an important part of Persian culture. Felling (2006) studied 15 Persian-American families where most of the families established a "Persian-only" rule for the home to support the heritage language. Despite this and the desire for bilingualism, many of the families were experiencing a language shift to English in the home because of the day-to-day demands of family life. Thus, even when intentions and attitudes are positive towards the heritage language and bilingualism, it may still be a challenge to impart the heritage language to future generations.

Limitations

There are several limitations associated with this study. First, the small sample size presents some challenges to statistical analyses. It is more challenging to obtain statistical significance with smaller sample sizes. Typically, when analyzing data based on small samples, large magnitude differences are needed to detect statistically significant differences. Thus, some potential study effects may have been masked by the small sample size. Moreover, the small sample size severely limited the statistical analyses that could be used to analyze the data, particularly the relationships between language input, production, and language skills. Thus, more studies need to be conducted with larger samples to address these more complex questions.

Second, I maximized the opportunity for reaching the most number of potential participants in one location by collaborating with an immersion school. This also ensured that children received significant exposure to Persian, which was necessary for the current study. However, because of this recruitment strategy, all bilingual participants attended the same full-day Persian immersion preschool, one of very few in the entire U.S. Thus, these children are a small unique subset of children in the U.S. who are learning Persian and English. Study findings may not generalize to other Persian-English children in the U.S. Ideally, the study would have included Persian-English bilingual children living throughout the U.S.

Third, this study was the first time the Persian tasks were used, as they were interpreted specifically for this study. Differences found in children's Persian and English composite scores, may be an artifact of inaccurate Persian testing. Further examination and analyses must be completed to determine the accuracy of the Persian tasks, especially when evaluating a broader sample of preschool children.

Fourth, while most parents completed the parent questionnaires in their entirety, some parents did not complete the questionnaires fully or at all. This is a critical issue particularly because one of the primary research questions focused on examining the input children receive from their parents in each language based on parent report. Furthermore, in the parent questionnaire, we asked parents about hours spent with their children and percent of each language spoken. Most families opted to answer only with percentages so quantity of input is less precise that originally anticipated. One improvement may be to condense the parent questionnaire to increase likelihood of completion. Alternatively, with technology such as LENA (Ford, Baer, XU, Yapanel, &

Gray, 2007), a daily recording device, it may be possible to complete more direct estimates of parental input.

Future Directions

The results of this study indicate further research is needed, specifically studies in which participants have experienced a wider range of language exposure by parents and teachers. The children in this study, while from families with varying degrees of Persian and English proficiency across caregivers, had consistent exposure to, and subsequently production of, Persian. To better understand this relationships it would be beneficial to include a wider range of Persian and English input and production, such as children who hear English with teachers during the week, but Persian with parents, or Persian with grandparents for the majority of the week.

We must also study language skills of children who speak heritage languages longitudinally (e.g., Pham & Kohnert, 2013; Pham, 2011). Cross-sectional data provides valuable information, but does not control for individual differences in language development. Assumptions must be made as data comes from one time point, but with children of varying ages. Longitudinal data would allow closer and more accurate inspection of how language develops in individual bilingual children and in groups of children over time. For example, the language skills of the children at Golestan should be studied as they progress throughout their years at the immersion school and after they transition to English-only schools. This would provide a better understanding of how the Persian heritage language changes over time.

Finally, the language of children with language impairments should be studied within the context of language immersion and heritage languages to address questions

such as. “How do parent input and child language production influence the Persian and English language skills of a child with a language disorder or impairment?” Research confirms that simultaneous and sequential bilingual children with language impairment are capable of being bilingual (see Kohnert, Yim, Nett, Kan, & Duran, 2005; Kohnert, 2010; Paradis, Crago, Genesee, & Rice, 2003). Relative to typically developing bilingual children, bilingual children with language impairment are likely to require increased levels of input of their heritage language (Ebert, Rentmeester-Disher, & Kohnert, 2012). For children with language impairment, it is likely that they may need even more input and exposure to their heritage language to ensure development.

Conclusion

This study examined the language abilities of Persian-English bilingual children aged 2- through 5-years who attended a Persian immersion preschool. Across all study analyses, results indicate that both Persian and English language skills can be adequately supported so that children obtain comparable language skills in both languages. Though the sample size was small, some significant findings and some notable trends highlight the importance of actively supporting heritage language development, potentially by increasing the amount of time children are exposed to the heritage language and/or the number of opportunities for children to use the heritage language.

Moreover, consistent with a large body of research, current study results indicate that young typically developing children can learn two languages. In the U.S., most bilingual children receive substantial English input and opportunities to speak English, allowing them to develop their English language skills. As noted previously, the heritage

language requires greater support to rival the support English receives (Pearson et al., 1997; Vihman et al., 2006).

Studying the language skills of children who are learning Persian and English may not only provide a greater understanding to bilingualism, but this may provide greater awareness of heritage languages and the importance of actively supporting their development. Strengthening the power of the heritage language may help children in their relationships, academics, and everyday life. Children may have better ties with their parents and extended family members, which may help them perform better in school, and achieve a high quality of life.

References

Aguayo, D., Herman, K., Ojeda, L., & Flores, L. Y. (2011). Culture predicts Mexican Americans' college self-efficacy and college performance. *Journal of Diversity in Higher Education*, *4*(2), 79–89. doi:10.1037/a0022504

American Speech-Language-Hearing Association. (2004). Knowledge and Skills Needed by Speech-Language Pathologists and Audiologists to Provide Culturally and Linguistically Appropriate Services [Knowledge and Skills].

American Speech-Language-Hearing Association (ASHA). (n.d.). *California Hearing Screening Requirements for Newborns and School-Aged Children*.

Arab-Moghaddam, N., & Sénéchal, M. (2001). Orthographic and phonological processing skills in reading and spelling in Persian/English bilinguals. *International Journal of Behavioral Development*, *25*(2), 140–147. doi:10.1080/01650250042000320

Bates, E., Bretherton, I., & Snyder, L. S. (1991). *From first words to grammar: Individual differences and dissociable mechanisms* (Vol. 20). Cambridge University Press.

Bayley, R., Schecter, S. R., & Torres-Ayala, B. (1996). Strategies for bilingual maintenance: Case studies of Mexican-origin families in Texas. *Linguistics and Education*, *8*(4), 389–408.

Bedore, L., Cooperson, S. J., & Boerger, K. M. (2004). Morphosyntactic Development. In B. A. Goldstein (Ed.), *Bilingual Language Development and Disorders in Spanish-English Speakers.* (pp. 175–192). ERIC.

Birnholz, J. C., & Benacerraf, B. R. (1983). The development of human fetal hearing. *Science*, *222*(4623), 516–518.

Bohman, T. M., Bedore, L. M., Peña, E. D., Mendez-Perez, A., & Gillam, R. B. (2010). What you hear and what you say: language performance in Spanish–English bilinguals. *International Journal of Bilingual Education and Bilingualism*, *13*(3), 325–344. doi:10.1080/13670050903342019

Boudaoud, M. (2008). *The variable development of /s/ + consonant onset clusters in Farsi-English interlanguage*. *Dissertation*. Concordia University, Montreal.

Brown, R. (1973). *A first language: The early stages*. Oxford: Harvard U. Press.

Brownell, R. (2000). Receptive One-Word Picture Vocabulary Test—Third Edition. Novato, CA: Academic Therapy Productions.

Brownell, R. (2001). Expressive One-Word Picture Vocabulary Test: Spanish–Bilingual Edition. Novato, CA: Academic Therapy Publications.

Capute, A. J., & Accardo, P. J. (1978). Linguistic and Auditory Milestones During the First Two Years of Life A Language Inventory for the Practitioner. *Clinical Pediatrics*, *17*(11), 847–853.

Chhuon, V. (2011). Adolescent Heritage Speakers of Less Commonly Taught Languages in the United States. *Language and Linguistics Compass*, *5*(9), 666–676. doi:10.1111/j.1749-818X.2011.00305.x

Conboy, B. T., & Thal, D. J. (2006). Ties between the lexicon and grammar: cross-sectional and longitudinal studies of bilingual toddlers. *Child Development*, *77*(3), 712–35. doi:10.1111/j.1467-8624.2006.00899.x

De Houwer, A. (2005). Early bilingual acquisition. In J. F. Kroll & A. M. B. de Groot (Eds.), *Handbook of bilingualism* (pp. 30–48). Oxford, U.K.: Oxford University Press.

Ebert, K. D., Rentmeester-Disher, J., & Kohnert, K. (2012). Nonlinguistic cognitive treatment for bilingual children with primary language impairment. *Clinical Linguistics & Phonetics*, *26*(6), 485–501.

Enstice, E. (2012). *Perceptions of Bilingualism and Home Language Maintenance and Loss: A Study of Latino Parents at a San Francisco Bay Area Elementary Charter School*. *Dissertation*. Retrieved from http://repository.usfca.edu/diss/28/

Extra, G., & Verhoeven, L. (1999). *Bilingualism and migration* (Vol. 14). Walter de Gruyter.

Farsi, M., & Leila, Z. (2013). Practical Contrastive Analysis of English and Persian with special emphasis on Relative Clauses. *Time Journals of Arts and Educational Research*, *1*(September), 7–9. Retrieved from

http://www.timejournals.org/tjaer/archive/2013/September/pdf/Farsi and Zarei PDF.pdf

Felling, S. (2006). *Fading Farsi: Language Policy, Ideology, and Shift in the Iranian American Family*. *Dissertation*. Georgetown University.

Fenson, L., Dale, P. S., Reznick, J. S., Bates, E., Thal, D. J., & Pethick, S. J. (1994). Variability in early communicative development. *Monographs of the Society for Research in Child Development*, *59*, 1–173; discussion 174–185. doi:10.2307/1166093

Fillmore, L. W. (1991). When learning a second language means losing the first. *Early Childhood Research Quarterly*, *6*, 323–346. doi:10.1016/S0885-2006(05)80059-6

Ford, M., Baer, C., XU, D., Yapanel, U., & Gray, S. (n.d.). The LENA Language Environment Analysis System: Audio Specifications. Boulder, CO: Infoture.

Foroodi-Nejad, F. (2011). *University of Alberta Towards the identification of linguistic characteristics of specific language impairment in Persian*. *Dissertation*. University of Alberta.

Foroodi-Nejad, F., & Paradis, J. (2009). Crosslinguistic transfer in the acquisition of compound words in Persian–English bilinguals. *Bilingualism: Language and Cognition*, *12*(04), 411. doi:10.1017/S1366728909990241

Genesee, F. (2008). Dual Language Development in Preschool Children. *National Institute for Early Education*, (1-39).

Goldstein, B. (2006). Clinical implications of research on language development and disorders in bilingual children. *Topics in Language Disorders*, *26*(4), 305–321.

Goodman, J. C., & Bates, E. (1997). On the inseparability of grammar and the lexicon: Evidence from acquisition, aphasia and real-time processing. *Language and Cognitive Processes*, *12*(5-6), 507–584.

Hammer, C. S., Davison, M. D., Lawrence, F. R., & Miccio, A. W. (2009). The Effect of Maternal Language on Bilingual Children's Vocabulary and Emergent Literacy Development During Head Start and Kindergarten. *Scientific Studies of Reading*, *13*(2), 99–121. doi:10.1080/10888430902769541

Hammer, C. S., Jia, G., & Uchikoshi, Y. (2011). Language and Literacy Development of Dual Language Learners Growing Up in the United States: A Call for Research. *Child Development Perspectives*, *5*(1), 4–9. doi:10.1111/j.1750-8606.2010.00140.x

Hammer, C. S., Komaroff, E., Rodriguez, B. L., Lopez, L. M., Scarpino, S. E., & Goldstein, B. (2012). Predicting Spanish-English bilingual children's language abilities. *Journal of Speech, Language, and Hearing Research : JSLHR*, *55*(5), 1251–64. doi:10.1044/1092-4388(2012/11-0016)

Hart, B., & Risley, T. (2003). The early catastrophe: The 30 million word gap by age 3. *American Educator*, 1–6. Retrieved from http://www.unitedwayracine.org/sites/default/files/imce/files/SOH The Early Catastrophe - The 30 Million Word Gap by Age 3 - Risley and Hart - summary.pdf

Hart, B., & Risley, T. R. (1992). American parenting of language-learning children: Persisting differences in family-child interactions observed in natural home environments. *Developmental Psychology*, *28*(6), 1096–1105. doi:10.1037//0012-1649.28.6.1096

Hoff, E. (2005). *Language Development* (3rd ed.). Belmont, CA: Wadsworth Publishing.

Hoff, E., Core, C., Place, S., Rumiche, R., Señor, M., & Parra, M. (2011). Dual language exposure and early bilingual development. *Journal of Child Language*, *39*(1), 1–27. doi:10.1017/S0305000910000759

Hoff-Ginsberg, E. (1985). Some contributions of mothers' speech to their children's syntactic growth. *Journal of Child Language*, *12*(2), 367–385.

Jackson-Maldonado, D., Thal, D., Marchman, V., Bates, E., & Gutiérrez-Clellen, V. (1993). Early lexical development in Spanish-speaking infants and toddlers. *Journal of Child Language*, *20*(03), 523–549.

Kan, P. F. (2008). *Novel word learning by sequential bilingual children: A longitudinal study*. *Dissertation*. Retrieved from http://books.google.com/books?hl=en&lr=&id=9w4qho138cIC&oi=fnd&pg=PR1&dq=Novel+Word+Learning+By+Sequential+Bilingual+Children:+A+Longitudinal+Study&ots=VaK58Y6oOz&sig=gwWKeKTwTGgVwt9VO2iRX7UU-CU

Kan, P. F., & Kohnert, K. (2005). Preschoolers learning Hmong and English: lexical-semantic skills in L1 and L2. *Journal of Speech, Language, and Hearing Research : JSLHR*, *48*(April), 372–83. doi:10.1044/1092-4388(2005/026)

Kan, P. F., & Kohnert, K. (2008). Fast mapping by bilingual preschool children. *Journal of Child Language*, *35*(3), 495–514. doi:10.1017/S0305000907008604

Kan, P. F., & Kohnert, K. (2011). A growth curve analysis of novel word learning by sequential bilingual preschool children. *Bilingualism: Language and Cognition*, *15*(03), 452–469. doi:10.1017/S1366728911000356

Keshavarz, M. H. (2007). Morphological development in the speech of a Persian-English bilingual child. *Journal of Psycholinguistic Research*, *36*(4), 255–72. doi:10.1007/s10936-006-9044-5

Keshavarz, M., & Safa, M. (2010). Early Phonological and Lexical Development of a Farsi Speaking Child: A Longitudinal Case Study. *The Journal of Applied Linguistics*, *3*(1). Retrieved from http://www.sid.ir/En/VEWSSID/J_pdf/1009720100108.pdf

Kohnert, K. (2009). Bilinguals with primary language impairment. In K. De Bot & R. W. Schrauf (Eds.), *Language development over the lifespan* (pp. 146–170). New York and London: Routledge.

Kohnert, K. (2010). Bilingual children with primary language impairment: issues, evidence and implications for clinical actions. *Journal of Communication Disorders*, *43*(6), 456–73. doi:10.1016/j.jcomdis.2010.02.002

Kohnert, K. (2013). *Language Disorders in Bilingual Children and Adults* (Second.). San Diego, CA: Plural Publishing.

Kohnert, K., & Bates, E. (2002). Balancing bilinguals II: Lexical comprehension and cognitive processing in children learning Spanish and English. *Journal of Speech, Language and Hearing Research*, *45*(2), 347–359. doi:10.1044/1092-4388(2002/027)

Kohnert, K., Kan, P. F., & Conboy, B. T. (2010). Lexical and grammatical associations in sequential bilingual preschoolers. *Journal of Speech, Language, and Hearing Research : JSLHR*, *53*(3), 684–98. doi:10.1044/1092-4388(2009/08-0126)

Kohnert, K., Yim, D., Nett, K., Kan, P. P. F., & Duran, L. (2005). Intervention with Linguistically Diverse Preschool Children: A Focus on Developing Home Language(s). *Language, Speech, and Hearing …*, *36*(July), 251–264. doi:10.1044/0161-1461(2005/025)

Macleod, A. A., Fabiano-Smith, L., Boegner-Pagé, S., & Fontolliet, S. (2013). Simultaneous bilingual language acquisition: The role of parental input on receptive vocabulary development. *Child Language Teaching and Therapy*, *29*(1), 131–142. doi:10.1177/0265659012466862

MacLeod, A. A. N., Laukys, K., & Rvachew, S. (2011). The impact of bilingual language learning on whole-word complexity and segmental accuracy among children aged 18 and 36 months. *International Journal of Speech-Language Pathology*, *13*(6), 490–499.

Mahootian, S., & Gebhardt, L. (1997). Persian. Descriptive grammars. London: Routledge.

Marchman, V., Martínez-Sussmann, C., & Dale, P. (2004). The language-specific nature of grammatical development: evidence from bilingual language learners. *Developmental Science*, *7*(2), 212–24. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/15320381

McLinden, D. (2011). *The Performance of Kindergarten Children Attending a Language Immersion School on a Novel Language-Learning Task*. University of Minneosta.

Mehler, J., Bertoncini, J., Barrière, M., & Jassik-Gerschenfeld, D. (1978). Infant recognition of mother's voice. *Perception*, *7*(5), 491–497.

Montrul, S. A. (2008). Incomplete acquisition in bilingualism: Re-examining the age factor (Vol. 39, pp. 94–100). John Benjamins Publishing.

Mostashari, A., & Levels, I. (2004). Factsheet on the Iranian-American community. *Iranian Studies Research Group, MIT Press, Cambridge, MA*.

Namei, S. (2008). Language Choice Among Iranians in Sweden. *Journal of Multilingual and Multicultural Development*, *29*(February), 419. doi:10.2167/jmmd602.0

Nazzi, T., Bertoncini, J., & Mehler, J. (1998). Language discrimination by newborns: toward an understanding of the role of rhythm. *Journal of Experimental Psychology. Human Perception and Performance*, *24*, 756–766. doi:10.1037/0096-1523.24.3.756

Oller, D. K. (1980). The emergence of the sounds of speech in infancy. *Child Phonology*, *1*, 93–112.

Padilla, A. M., & Lindholm, K. L. (1984). Child bilingualism: The same old issues revisited.

Paradis, J. (2009). *Oral language development in French and English and the role of home input factors*. Edmonton, Alberta, Canada.

Paradis, J., Crago, M., Genesee, F., & Rice, M. (2003). French-English Bilingual Children With SLIHow Do They Compare With Their Monolingual Peers? *Journal of Speech, Language, and Hearing Research*, *46*(1), 113–127.

Paradis, J., & Genesee, F. (1996). Syntactic acquisition in bilingual children. *Studies in Second Language Acquisition*, *18*(01), 1–25.

Parra, M., Hoff, E., & Core, C. (2011). Relations among language exposure, phonological memory, and language development in Spanish-English bilingually developing 2-year-olds. *Journal of Experimental Child Psychology*, *108*(1), 113–25. doi:10.1016/j.jecp.2010.07.011

Patterson, J. L. (2002). Relationships of expressive vocabulary to frequency of reading and television experience among bilingual toddlers. *Applied Psycholinguistics*, *23*, 493–508. doi:10.1017/S0142716402004010

Pearson, B., Fernández, S. C., & Oller, D. K. (1995). Cross-language synonyms in the lexicons of bilingual infants: one language or two? *Journal of Child Language*, *22*(2), 345–68. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/8550727

Pearson, B. Z. (2007). Social factors in childhood bilingualism in the United States. *Applied Psycholinguistics*, *28*(03), 399–410. doi:10.1017/S014271640707021X

Pearson, B. Z. (2008). *Raising a bilingual child*. Living Language.

Pearson, B. Z., Fernández, S. C., Lewedeg, V., & Oller, D. K. (1997). The relation of input factors to lexical learning by bilingual infants. *Applied Psycholinguistics*, *18*(01), 41. doi:10.1017/S0142716400009863

Pearson, B. Z., Fernández, S. C., & Oller, D. K. (1993). Lexical development in bilingual infants and toddlers: Comparison to monolingual norms. *Language Learning*, (March), 93–120. Retrieved from http://onlinelibrary.wiley.com/doi/10.1111/j.1467-1770.1993.tb00174.x/abstract

Peña, E., Bedore, L., Gutierrez-Clellen, V. F., Iglesias, A., & Goldstein, B. (n.d.). BESOS: Bilingual English Spanish Oral Screener.

Peña, E. D., Bedore, L. M., & Zlatic-Giunta, R. (2002). Category-generation performance of bilingual children: the influence of condition, category, and language. *Journal of*

Speech, Language, and Hearing Research : JSLHR, *45*(5), 938–47. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/12381051

Petitto, L. a, Katerelos, M., Levy, B. G., Gauna, K., Tétreault, K., & Ferraro, V. (2001). Bilingual signed and spoken language acquisition from birth: implications for the mechanisms underlying early bilingual language acquisition. *Journal of Child Language*, *28*(2), 453–96. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/11449947

Pham, G., & Kohnert, K. (2010). Sentence interpretation by typically developing Vietnamese–English bilingual children. *Applied Psycholinguistics*, *31*(03), 507–529. doi:10.1017/S0142716410000093

Pham, G., & Kohnert, K. (2013). A Longitudinal Study of Lexical Development in Children Learning Vietnamese and English. *Child Development*, *00*(0), 1–16. doi:10.1111/cdev.12137

Pham, G. T. (2011). *Dual Language Development among Vietnamese-English Bilingual Children: Modeling Trajectories and Cross-Linguistic Associations within a Dynamic Systems Framework*. *Dissertation*. University of Minnesota.

Place, S., & Hoff, E. (2011). Properties of Dual Language Exposure That Influence 2-Year-Olds' Bilingual Proficiency. *Child Development*, *82*(6), 1834–1849. doi:10.1111/j.1467-8624.2011.01660.x

Portes, A., & Rumbaut, R. G. (2001). *Legacies: The story of the immigrant second generation*. Univ of California Press.

Public Affairs Alliance of Iranian Americans. (2013). *2013 Survey of Iranian-Americans*.

Rumbaut, R. G. (2009). A Language Graveyard? The Evolution of Language Competencies, Preferences and Use Among Young Adult Children of Immigrants. In T. G. Wiley, J. S. Lee, & R. Rumberger (Eds.), *The Education of Language Minority Immigrants in the United States* (pp. 35–71).

Salahshoor, M. (2011). Iranian-American Parent's Attitudes and Behaviors towards Persian Language Dev and Maintenance in their Children. *(Thesis)*.

Semel, E. M., Wiig, E. H., & Secord, W. (2004). *CELF preschool 2: clinical evaluation of language fundamentals preschool*. Pearson/PsychCorp.

Sheng, L., Lu, Y., & Kan, P. F. (2011). Lexical development in Mandarin–English bilingual children. *Bilingualism: Language and Cognition*, *14*(04), 579–587. doi:10.1017/S1366728910000647

Shin, H. B., & Kominski, R. A. (2010). Language Use in the United States: 2007, American Community Survey Reports, ACS-12. *US Census Bureau, Washington, DC*.

Simon-Cereijido, G., & Gutiérrez-Clellen, V. F. (2009). A cross-linguistic and bilingual evaluation of the interdependence between lexical and grammatical domains. *Applied …*, *30*(2), 315–337. doi:10.1017/S0142716409090134

Tedick, D. J., Christian, D., & Fortune, T. W. (2011). *Immersion education: Practices, policies, possibilities* (Vol. 83). Multilingual Matters.

The Public Affairs Alliance of Iranian Americans. (n.d.). Demographics & Statistics. Retrieved May 31, 2015, from http://www.paaia.org/CMS/demographics--statistics.aspx

Thomas, W. P., Collier, V. P., & Collier, K. (2011). English learners in North Carolina, 2010. *Fairfax, VA: George Mason University. A Research Report Provided to North Carolina Department of Public Instruction. Retrieved from http://p1cdn3static. Sharpschool. com/UserFiles/Servers/Server_4502383/File/NC_ELL_Study_Yr2_Final% 20Report_Jul27_2011. Pd*, (3), 1–45.

Thordardottir, E. (2011). The relationship between bilingual exposure and vocabulary development. *International Journal of Bilingualism*, *15*(4), 426–445. doi:10.1177/1367006911403202

Thordardottir, E. (2014). The relationship between bilingual exposure and morphosyntactic development. *International Journal of Speech-Language Pathology*, (0), 1–18.

Tseng, V., & Fuligni, A. (2000). Parent□Adolescent Language Use and Relationships Among Immigrant Families With East Asian, Filipino, and Latin American Backgrounds. *Journal of Marriage and Family*, *62*(2), 465–476. Retrieved from http://onlinelibrary.wiley.com/doi/10.1111/j.1741-3737.2000.00465.x/full

U.S. Census Bureau. (2012). *American Community Survey*. Retrieved from https://www.census.gov/prod/2013pubs/acs-22.pdf

U.S. Census Bureau. (2013). *2013 American Community Survey, Table S0201*. Retrieved from http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_13_1YR_S0201&prodType=table

Veltman, C. (1988). Modelling the language shift process of Hispanic immigrants. *International Migration Review*, 545–562.

Vihman, M. M., Lum, J. A. G., Thierry, G., Nakai, S., & Keren-Portnoy, T. (2006). The onset of word form recognition in one language and in two. *Childhood Bilingualism: Research on Infancy through School Age*, 30–44.

Wastie, S. (1994). Supporting families at risk for language loss. *Canadian Childcare Federation*.

Wiley, T. G. (1996). *Literacy and Language Diversity in the United States. Language in Education: Theory and Practice 87*. McHenry, IL: Delta Systems Co., Inc.

Willard, J. A., Agache, A., Jäkel, J., Glück, C. W., & Leyendecker, B. (2014). Family factors predicting vocabulary in Turkish as a heritage language. *Applied Psycholinguistics*, *First View*, 1–24. doi:10.1017/S0142716413000544

Yip, V., & Matthews, S. (2010). The acquisition of Chinese in bilingual and multilingual contexts. *International Journal of Bilingualism*, *14*(1), 127–146. doi:10.1177/1367006909356652

Yousef, S., & Torabi, H. (2012). *Basic Persian: A Grammar and Workbook*. Routledge.

Appendices

Appendix A
Background Information Parent Questionnaire

Your Name: _____ Relationship to Child: _____

Child's Name: _____
Date of Birth: _____ Age: _____ Gender: M or F

Your Child's School(s)

1. School: Golestan Center for Language Immersion and Cultural Education
2. Grade / class: _____ (example: Joojeh)
3. Number of days per week child attends Golestan: ____
4. Number of hours per day child attends Golestan: ____
5. At what age did your child begin at Golestan? ____ years ____ months
6. Did your child attend another school prior to Golestan? ☐ Yes ☐ No

   If yes, what school and for how long?

   _____

Your Child's Language Use and History

7. Was your child born in the U. S.? ☐ Yes

   ☐ No, He/she came to the U. S. when ____ years ____ months old.

8. Describe your child's current language skills:

Speaking	Always Speaks	Speaks Mostly	Speaks Occasionally	Never Speaks	*Age began using:*
Persian	☐	☐	☐	☐	
English	☐	☐	☐	☐	
Other:	☐	☐	☐	☐	

Understanding	**Understands Everything**	**Understands Most**	**Understands Some**	**Understands None**	***Age first exposed to:***
Persian	☐	☐	☐	☐	
English	☐	☐	☐	☐	
Other:	☐	☐	☐	☐	

9. Describe your child's language skills in the two months before enrolling in Golestan, when they were ____ years ____ months old.

Speaking	**Always Spoke**	Spoke Mostly	Spoke Occasionally	Never Spoke
Persian	☐	☐	☐	☐
English	☐	☐	☐	☐
Other:	☐	☐	☐	☐

Understanding	Understood Everything	Understood Most	Understood Some	Understood None
Persian	☐	☐	☐	☐
English	☐	☐	☐	☐
Other:	☐	☐	☐	☐

10. Rate your child's *Persian* language abilities as compared to monolingual Persian speakers of the same age.

	At age expectations	Emerging	Doesn't use/apply	Concern?
Expressing wants, needs, and thoughts verbally	☐	☐	☐	Y N
Using language to interact with peers	☐	☐	☐	Y N
Size of vocabulary	☐	☐	☐	Y N
Retelling details of a story	☐	☐	☐	Y N
Using speech that can be understood	☐	☐	☐	Y N
Using appropriate words rather than fillers (e.g., that "thing")	☐	☐	☐	Y N
Length of sentences	☐	☐	☐	Y N
Using tense appropriately to describe events	☐	☐	☐	Y N

11. Rate your child's *English* language abilities as compared to monolingual English speakers of the same age.

	At age expectations	Emerging	Doesn't use/apply	Concern ?
Expressing wants, needs, and thoughts verbally	☐	☐	☐	Y N
Using language to interact with peers	☐	☐	☐	Y N
Size of vocabulary	☐	☐	☐	Y N
Retelling details of a story	☐	☐	☐	Y N
Using speech that can be understood	☐	☐	☐	Y N
Using appropriate words rather than fillers (e.g., that "thing")	☐	☐	☐	Y N
Length of sentences	☐	☐	☐	Y N
Using tense appropriately to describe events	☐	☐	☐	Y N

Family Demographics

12. With whom does your child live?

Adults	**Highest Grade / Degree**	**Occupation**
Example: Mother	*College: Bachelor's Degree*	*Nurse*

Children	**Current Age**	**Current Grade** *(if applicable)*

13. What is approximate yearly income of your child's household?

☐ $0 - $25,000 ☐ $50,001 - $100,000 ☐ $150,001 +
☐ $25,001 $50,000 ☐ $100,001 - $150,000

14. Rate your child's exposure to Persian culture:

1 (no other exposure outside of Golestan), 2 (exposure within immediate family), 3 (exposure with extended family), or 4 (exposure with larger community): ____

15. Describe the exposure your child has to Persian culture (i.e., what type of exposure and how often).

16. What Iranian traditions do you maintain (e.g., food, music, holidays)? What is your child's involvement in these traditions?

17. Do you have specific celebrations in your family or community?

Your Child's Communication Profile

18. Use the table to list family members or friends that are regular communicators with your child. *(Please, continue on the back if necessary.)*

		Weekday (Monday-Friday)		***Weekend (Saturday & Sunday)***		
Communication Partner	**Language(s) Spoken to Child**	*Time Spent with Child in a 24 Hr Day (not including time asleep)*	*% Time Spoken to Child*	*Time Spent with Child in a 24 Hr Day (not including time asleep)*	*% Time Spoken to Child*	**Communication Partner's Native Language**
Example: mom	*Persian*	*6 hours / day*	*60%*	*14 hours / day*	*95%*	*Persian (mom learned English @ 5 years old)*
	English		*40%*		*5%*	
1.	Persian					
	English					
	Other: _____					
2.	Persian					
	English					
	Other: _____					
3.	Persian					
	English					
	Other: _____					
4.	Persian					
	English					
	Other: _____					

19. What language(s) does <u>your child use</u> in the following settings or with the following people? If your child uses more than one language in each setting, please indicate the percent of your child's using each language. *(Please, continue below if there are more, relevant settings to your child's language.)*

Setting	% of Time Spent Using Persian	% of Time Spent Using English	% of Time Spent Using Other Language	Estimated Hours per Day or Week (or Weekend)
Example: At home, weekdays	*50%*	*50%*	-	*Persian 3 hours, English 3 hours / per day <u>OR</u> 6 hours Persian with mom and 6 hours English with dad, simultaneously*
At home, weekdays				
At home, weekends				
At school				
When he/she reads				
When he/she writes				
With his/her parent(s)				
With grandparent(s)				
With younger sibling(s)				
With older sibling(s)				
With his/her friends				
When watching TV/videos				
Additional setting(s):				

20. What language(s) do most of your child's friends speak (with your child)?

☐ Persian only ☐ English only

☐ Persian (____ %) & English (____ %)

☐ Other languages: _____

Child Development

21. Were there any complications during the mother's pregnancy?

☐ No ☐ Don't know ☐ Yes _____

22. At approximately what age did your child begin to walk? _____

23. At approximately what age did your child begin to talk? _____

24. Do you have any concerns about your child's speech and language?

☐ No ☐ Yes; If yes, what is your concern?

_____

25. Is your child currently in speech/language therapy? ☐ No ☐ Yes

Has your child ever participated in speech/language therapy?

☐ No ☐ Yes, __ months __ years

26. Are there any other developmental or medical concerns with your child?

☐ No ☐ Yes _____

27. Has your child's hearing been tested in the last year?

☐ No ☐ Yes, Pass *or* Fail

28. Is there anything else you'd like to tell us about your child's language?

Appendix B

Sample Items from Protocols of Persian Battery

1. Receptive One Word Picture Vocabulary Test

Item	English	Persian
1	shoe	kafsh
2	car	mashin
3	spoon	ghashogh
4	bed	takht
5	fish	Mahi

2. Expressive One Word Picture Vocabulary Test

Item	English	Persian
1	boat	ghayegh
2	tree	derakht
3	apple	sib
4	eye(s)	chesm
5	kitty/kitten/cat	gorbeh/pishi/bache gorbeh

3. Sentence Repetition from CELF-P:2

Item	Sentence	Words	Morphemes
1	He is nice.	3	3
	Pesare khoobi hast.	*3*	*5*
2	They play with blocks.	4	5
	Oonha ba blokha bazi mikonand.	*5*	*7*
4	Didn't the boys eat the apples?	6	9
	Mage pesarha sibharo nakhordan?	*4*	*8*
7	The big brown dog ate all of the cat's food.	10	11
	Oon sage bozorg va ghahvei tamame ghazahaye gorbeh ra khord.	*10*	*15*
9	The kindergartner cannot cross the street by himself.	8	10
	Bachehe nemitoone tanhai khiaboonro raat kone.	*6*	*9*

4. Sentence Structure from CELF-P:2

Item	Sentence	Words	Morphemes
1	The boy is sleepy.	4	5
	Oon pesare khabesh miyad.	*4*	*6*
2	The bear is in the wagon.	6	6
	Oon kherse tooye vagon hast.	*5*	*6*
3	The girl is running.	4	5
	Oon dokhtare dare midoe.	*4*	*5*
4	The girl has a big, spotted, black and white dog.	10	11
	Oon dokhtare yek sage bozorg va khal-khalie sefid va meshki dare.	*11*	*15*
6	They like to bake cookies.	5	6
	Oonha doost daran shirni bepazan.	*5*	*7*